



MEMC 98-0410 (2489)
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of Robert J. Falster
Serial No. 09/366,850
Filed August 4, 1999
Confirmation No. 3575
For NON-UNIFORM MINORITY CARRIER LIFETIME DISTRIBUTIONS IN HIGH
PERFORMANCE SILICON POWER DEVICES
Examiner W. Mintel

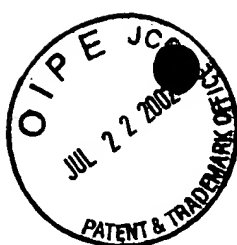
Art Unit 2811

#21/ Appeal
Brief
7/31/02
H. Smith

BRIEF FOR APPELLANTS

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Examiner W. Mintel

BRIEF FOR APPELLANTS

This is an appeal from the final rejection of the above-identified application made in the Office action mailed September 18, 2001. A Notice of Appeal was mailed on February 19, 2002.

I. REAL PARTY IN INTEREST

The real party in interest in connection with the present appeal is MEMC Electronic Materials Inc., owner of a 100 percent interest in the pending application.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any pending appeals or interferences which may directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-34 are pending in this application. In a Response to Restriction Requirement filed on January 12, 2001, Applicant elected claims 1-22 for examination and withdrew claims 23-34 from consideration in reply to an Office action dated December 21, 2000. This is an appeal from the final rejection of claims 1-22 under

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35 U.S.C. §102(b) as being anticipated by Temple et al.¹ The claims on appeal are set forth in full in the Appendix to this Brief.

IV. STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

V. SUMMARY OF THE INVENTION

In the design of solid state power devices, fast switching speed and forward voltage drop are important device efficiency goals. As the switching speed increases and the forward voltage drop decreases, the device becomes more efficient.²

In its "on" state, a minority carrier device, such as a thyristor, is flooded with excess minority carriers which must be dissipated to turn the device off.³ Faster switching may be achieved by increasing the rate of excess minority carrier recombination, a major mechanism for excess carrier dissipation.⁴ Minority carrier recombination lifetime is commonly used as an inverse measure of the recombination rate.⁵ Thus, doping devices with "lifetime killing" impurities, which operate as minority carrier recombination centers, increases the recombination rate, *i.e.* decrease the recombination lifetime, thereby providing faster switching.⁶

In the past, such impurity doping has been applied to large areas of the device, resulting in significant decreases in the device turn-off time.⁷ However, if the

¹Temple, Victor, A.K. et al., "Optimizing Carrier Lifetime Profile for Improved Trade-off Between Turn-off Time and Forward Drop", IEEE Transactions on Electron Devices, Vol. ED-30, No. 7 (1983) pp. 782-790.

²See Applicant's Specification page 1, lines 14-17.

³See Applicant's Specification page 1, lines 21-28.

⁴See Applicant's Specification page 1, lines 21-28.

⁵See Applicant's Specification page 7, lines 17-18.

⁶See Applicant's Specification page 1, lines 25-28 and page 2, lines 6-9.

⁷See Applicant's Specification page 2, lines 11-14.

recombination rate is high throughout the bulk of the device, then a higher voltage is required to run the device, which increases power consumption and, accordingly, decreases the efficiency of the device. A superior approach involves increasing switching speed by doping specific regions of a device to create areas of low minority carrier recombination lifetimes while leaving the bulk undoped to prevent a large forward voltage drop.⁸

Applicant has discovered a method for preparing a silicon segment having minority carrier recombination centers at peak concentrations in specific regions with the remainder of the segment having comparatively lower concentrations.⁹ The method employs a mechanism through which a lifetime killing impurity, e.g. a platinum atom, diffuses through the silicon segment and interacts with a "vacancy"-type intrinsic point defect.¹⁰ A vacancy is an empty space which would otherwise be occupied by an atom in a defect-free crystal lattice structure. The impurity atom fills the vacancy and becomes a substitutional atom in the lattice structure at the location of the vacancy.¹¹ Accordingly, it has been discovered that, by controlling the vacancy concentration profile of a segment, a "template" for lifetime killing impurities is created in the silicon. Thus, minority carrier recombination centers can be incorporated within the material at a desired depth distribution and thereby provide a device which exhibits optimum performance.¹²

The present invention is directed to a single crystal silicon segment having a non-uniform distribution of minority carrier recombination centers in which the peak density of the centers is either (i) at or near a central plane between two generally

⁸See Applicant's Specification page 2, lines 18-27.

⁹See Applicant's Specification at page 7, lines 1-7.

¹⁰See Applicant's Specification at page 10, lines 4-6.

¹¹See Applicant's Specification at page 10, lines 4-6.

¹²See Applicant's Specification at page 10, lines 27-29 and page 22, lines 17-20.

parallel surfaces of the segment¹³ or (ii) in a region which is between the front surface and the central plane and nearer to the front surface than the central plane¹⁴. The concentration density generally decreases from the peak in the direction of the front surface and/or the central plane.¹⁵

The starting material for this process may be a polished silicon segment, such as a silicon wafer, or alternatively, a silicon segment which has been lapped and etched but not polished.¹⁶ Also, the silicon segments may be of varying thicknesses, especially the typical thicknesses of devices of interest, such as thyristors, power diodes, and low noise, high performance silicon detectors.¹⁷ Preferably, the presence of substitutional carbon, present for example as an impurity, is limited.¹⁸

In a first embodiment, wherein the peak recombination center concentration is at or near the central plane of the silicon segment, the bulk of the segment has a greater concentration of recombination centers than does a surface layer which extends a distance D_1 below the front surface.¹⁹ Furthermore, this surface layer is further characterized by minimum values for the distance D_1 and by maximum recombination center concentrations.²⁰ In a second embodiment, wherein the peak is nearer to the front surface than to the central plane, the peak location is further characterized by its distance from the front surface.²¹

¹³Claim 1.

¹⁴Claim 13.

¹⁵Claims 1 and 13.

¹⁶See Applicant's Specification page 25, lines 19-21.

¹⁷See Applicant's Specification page 12, line 25 to page 13, line 3.

¹⁸See Applicant's Specification page 12, lines 3-9.

¹⁹Claim 1.

²⁰Claims 6-11.

²¹Claims 18-21.

VI. ISSUE

The sole issue presented on appeal is whether claims 1-22 satisfy 35 U.S.C. §102(b) in view of Temple et al.

VII. GROUPING OF CLAIMS

For the reasons stated in Sections VIII (A) - (K), *infra*, claims 1-22 do not stand or fall together. The claims have been divided into eleven groups:

- Group I (claim 1),
- Group II (claims 2 and 3),
- Group III (claims 4 and 5),
- Group IV (claims 6 and 7),
- Group V (claims 8-11),
- Group VI (claim 12)
- Group VII (claim 13)
- Group VIII (claims 14 and 15),
- Group IX (claims 16 and 17),
- Group X (claims 18-21), and
- Group XI (claim 22).

The claims of Groups I - XI are separately and independently patentable for the reasons described in Sections VIII(A) - VIII(K), *infra*.

VIII. ARGUMENT

A. CLAIM 1 IS NOT ANTICIPATED BY TEMPLE ET AL.

Claim 1 is directed to a single crystal silicon segment having, among other elements, a non-uniform distribution of minority carrier recombination centers, characterized by a concentration of centers in a bulk layer being greater than a concentration of centers in a surface layer. The peak density of centers is at or near a central plane of the silicon segment.

In their paper, Temple et al. merely **propose** a structure for improved trade-off between turn-off time and forward drop. According to Temple et al., the trade-off

between forward voltage drop and device turn-off time can be significantly altered by the proper location of a narrow region of lower lifetime, oriented perpendicular to the current flow. To illustrate this, they present certain calculations and a figure, Fig. 4, which depicts a **proposed** thyristor structure with a single low lifetime region. The absence of an actual device is indicated in the introduction to the paper,

We describe the **proposed structures** and comment on the results of our feasibility study which, to date, is **based primarily on exact computer modeling**. Preliminary device studies are underway.²²

Temple et al. did not prepare such a structure nor did they disclose how their proposed structure may be made, much less how to make the claimed invention.

To anticipate claim 1, the Temple et al. publication must be enabling; *i.e.*, it must sufficiently describe each and every element of the claimed invention, either expressly or inherently, "such that a person of ordinary skill in the art could practice the invention **without undue experimentation**. Advanced Display Systems Inc. v. Kent State University, 212 F.3d 1272, 1282, 54 USPQ2d 1673, 1679 (Fed. Cir. 2000) (emphasis added), cert. denied, 121 S.Ct. 1226 (2000). See also Helifix Ltd. v. Blok-Lok Ltd., 208 F.3d 1339, 1346, 54 USPQ2d 1299, 1303 (Fed. Cir. 2000) (quoting In re Paulsen, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994)); In re Sheppard, 339 F.2d 238, 242, 144 USPQ 43, 45 (CCPA 1964). Failed attempts by those skilled in the art, having the information disclosed by a publication, to practice an invention is strong evidence that the publication is not enabling. See In re Donohue, 766 F.2d 531, 533, 226 USPQ 619, 621 (Fed. Cir. 1985).

In this case, Temple et al. admit that possession of the device which they propose was, at the time of the article, beyond the capabilities of the authors and others. According to Temple et al.,

the basic structure of Fig. 4 is not easily achievable experimentally. Any practical **applications would involve an extensive development program** (which is currently underway at General Electric Co) with an **unknown chance of success**. To discuss, in detail, **possible** methods

²²Temple et al., at 782, emphasis added.

for implementing the **proposed** structure is outside the scope of this paper.²³

Though attempts to prepare a device were ongoing, **failure** by the authors and others skilled in the art in attempting to actually prepare such a device is exposed by the need for additional development. Furthermore, this additional development amounts to **undue experimentation**, as indicated by Temple et al. insofar as they cannot estimate the likelihood of success from even an **extensive** development program. Rather than attempt to enable their proposal, Temple et al. purposefully omit all information related to practicing the disclosed structure by removing discussion of any **possible** methods from the scope of the publication. Therefore, Temple et al. do not enable the proposed structure, nor could they at the time of their publication.

Not only do Temple et al. fail to provide an enabling disclosure for that which they depict, they do not disclose the invention defined by claim 1. Claim 1 specifically requires a single crystal **silicon** segment. In contrast, Temple et al. merely describe semiconductor devices, generically. Regardless of whether silicon is a notoriously well-known semiconductor, other semiconductor materials exist. The mere recitation of semiconductor, therefore, is not an anticipation of silicon.

In summary, therefore, Temple et al. fail to enable a person of ordinary skill to prepare the silicon segment defined by claim 1 and, in addition, fail to disclose silicon segments, in any event. Consequently, Temple et al. do not anticipate claim 1.

B. THE GROUP II CLAIMS (claims 2 & 3) ARE NOT ANTICIPATED

Claims 2 and 3 each depend from claim 1 and are not anticipated by Temple et al. for the same reasons claim 1 is not anticipated. In addition, claims 2 and 3 are separately and independently patentable in view of their respective requirements concerning the concentration of carbon in the segment. Claim 2 is representative.

Temple et al. fail to expressly disclose any carbon concentration. In such instances, a reference can only be found to be anticipatory if the undisclosed element is inherently present in the cited reference. See Advanced Display Systems, 212 F.3d at

²³Temple et al., at 784, emphasis added.

1282, 54 USPQ2d at 1679. In relying upon the theory of inherency, the Office must establish a *prima facie* case, *i.e.* "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic **necessarily** flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The Office has not done this. The Office has merely noted that Temple et al. do not disclose intentional carbon doping.²⁴ However, Temple et al. do not require that the proposed structure must not be carbon doped. Furthermore, the Office has not claimed nor supported a determination that the structure proposed by Temple et al., even in the absence of carbon doping, would necessarily have the carbon concentrations described in claim 2.

In summary, the Office has failed to demonstrate that Temple et al. inherently or expressly disclose silicon segments satisfying the carbon concentrations of claim 2. Consequently, Temple et al. do not anticipate the Group II claims (claims 2 & 3).

C. THE GROUP III CLAIMS (claims 4 & 5) ARE NOT ANTICIPATED

Claims 4 and 5 each depend from claim 1 and are not anticipated by Temple et al. for the same reasons claim 1 is not anticipated. In addition, claims 4 and 5 are separately and independently patentable in view of their respective requirements concerning the thickness of the silicon segment. Claim 4 is representative.

Temple et al. fail to disclose the claimed ranges of thickness even with regard to the theoretical devices proposed,²⁵ and the Office has incorrectly cited to Figure 5 with regard to claim 4. The Office notes that Figure 5 shows a concentration peak at 100

²⁴Office action dated April 9, 2001, at page 2, paragraph 5 and Office action dated September 18, 2001, at page 2, paragraph 4.

²⁵See Temple et al., Figures 7, 10, and 12. In these figures, Temple et al. teaches devices which are 300 microns thick versus the invention described in claim 4 which is 500 to 800 microns thick.

microns.²⁶ This characterization is misleading as well as irrelevant to the thickness required by claim 4. First, Figure 5 is actually of a prior art thyristor²⁷ and not the device proposed by Temple et al. Second, the "peak" in Figure 5 is in electron lifetime, which is inversely related to concentration. Third, the Office fails to explain how the location of this "peak" is in any way relevant to the thickness element of claim 4. In fact, it is irrelevant.

In summary, by citing to Figure 5 the Office has failed to show how Temple et al. disclose the thickness of the segment in the range defined by claim 4. Consequently, Temple et al. do not anticipate the Group III claims (claims 4 & 5).

D. THE GROUP IV CLAIMS (claims 6 & 7) ARE NOT ANTICIPATED

Claims 6 and 7 each depend from claim 1 and are not anticipated by Temple et al. for the same reasons claim 1 is not anticipated. In addition, claims 6 and 7 are separately and independently patentable in view of their respective requirements concerning the concentration of minority carrier recombination centers in the surface layer. Claim 7 is representative.

The Office has not even attempted a *prima facie* case of anticipation with respect to claim 7. The Office has the initial burden of "coming forward with some sort of evidence tending to disprove novelty." In re Wilder, 429 F.2d 447, 450, 166 USPQ 545, 548 (CCPA 1970). Specifically, the burden is to "identify wherein each and every facet of the claimed invention is disclosed in the applied reference." Ex parte Levy, at 1462 (Bd. Pat. App. & Int. 1990). In this instance, the Office has neglected to address claim 7 and, therefore, has not identified wherein the claimed surface layer recombination center concentrations are disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose a silicon segment with a surface layer having the claimed concentrations of minority carrier recombination centers. The burden is upon the Office to establish a *prima facie* case of anticipation, and this burden has not been

²⁶Office action dated April 9, 2001, at page 2, paragraph 5 and Office action dated September 18, 2001, at page 2, paragraph 4.

²⁷Temple et al., at page 784.

carried. Consequently, Temple et al. do not anticipate the Group IV claims (claims 6 & 7).

E. THE GROUP V CLAIMS (claims 8-11) ARE NOT ANTICIPATED

Claims 8-11 each depend from claim 1 and are not anticipated by Temple et al. for the same reasons claim 1 is not anticipated. In addition, claims 8-11 are separately and independently patentable in view of their respective requirements concerning the depth of the surface layer, D_1 . Claim 8 is representative.

Temple et al. fail to disclose the depth of a designated surface layer even with regard to the theoretical devices proposed, and the Office has incorrectly cited to Figure 5 with regard to claim 8. The Office notes that Temple et al. Figure 5 shows a concentration peak at 100 microns.²⁸ For the reasons presented in Section VIII (C), *supra*, this characterization is misleading as well as irrelevant to the surface layer depth required by claim 8. The Office fails to explain how the location of this "peak" is in any way relevant to the depth of the surface layer as described in claim 8. In fact, it is irrelevant.

In summary, by citing to Figure 5 the Office has failed to show how Temple et al. disclose the depth of the surface layer of the invention as described in claim 8. Consequently, Temple et al. do not anticipate the Group V claims (claims 8-11).

F. CLAIM 12 IS NOT ANTICIPATED

Claim 12 depends from claim 1 and is not anticipated by Temple et al. for the same reasons claim 1 is not anticipated. In addition, Claim 12 is separately and independently patentable in view of its respective requirement that the front surface of the silicon segment is polished.

²⁸Office action dated April 9, 2001, at page 2, paragraph 5 and Office action dated September 18, 2001, at page 2, paragraph 4.

As with claims 6 and 7, the Office has failed to attempt a *prima facie* case against claim 12.²⁹ In this instance, the Office has neglected to address claim 12 and, therefore, has not identified wherein the claimed silicon segment with a polished surface is disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose a silicon segment with a polished surface. The burden is upon the Office to establish a *prima facie* case of anticipation and this burden has not been carried. Consequently, Temple et al. do not anticipate claim 12.

G. CLAIM 13 IS NOT ANTICIPATED

Claim 13 is independently and separately patentable in view that it is directed to a single crystal silicon segment having, among other elements, a non-uniform distribution of minority carrier recombination centers with a maximum concentration of the recombination centers being in a region which is between the front surface and the central plane and nearer to the front surface than the central plane and with the concentration of the recombination centers increasing from the front surface to the region of maximum concentration and decreasing from the region of maximum concentration to the central plane.

As with claims 6, 7, and 12, the Office has failed to attempt a *prima facie* case against claim 13.³⁰ In this instance, the Office has neglected to address claim 13 and, therefore, has not identified wherein any elements as described in claim 13 are disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose the invention described in claim 13. Specifically, Temple et al. do not disclose (i) a single crystal silicon segment, (ii) a non-uniform distribution of recombination centers with a maximum concentration which is between the front surface and the central plane and nearer to the front surface than the central plane, nor (iii) a distribution of recombination centers with the concentration increasing from the front

²⁹See Seciton VIII(D), *supra*, for the burden on the Office to establish a *prima facie* case of anticipation.

³⁰See Seciton VIII(D), *supra*, for the burden on the Office to establish a *prima facie* case of anticipation.

surface to the region of maximum concentration and decreasing from the region of maximum concentration to the central plane. The burden is upon the Office to establish a *prima facie* case of anticipation and this burden has not been carried. Consequently, Temple et al. do not anticipate claim 13.

H. THE GROUP VIII CLAIMS (claims 14 & 15) ARE NOT ANTICIPATED

Claims 14 and 15 each depend from claim 13 and are not anticipated by Temple et al. for the same reasons claim 13 is not anticipated. In addition, claims 14 and 15 are separately and independently patentable in view of their respective requirements concerning the concentration of carbon in the segment. Claim 14 is representative.

As with claims 6, 7, 12, and 13, the Office has failed to attempt a *prima facie* case against claim 14.³¹ In this instance, the Office has neglected to address claim 14 and, therefore, has not identified wherein the claimed carbon concentrations are disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose the claimed carbon concentrations. The burden is upon the Office to establish a *prima facie* case of anticipation and this burden has not been carried. Consequently, Temple et al. do not anticipate the Group VIII claims (claims 14 & 15).

I. THE GROUP IX CLAIMS (claims 16 & 17) ARE NOT ANTICIPATED

Claims 16 and 17 each depend from claim 13 and are not anticipated by Temple et al. for the same reasons claim 13 is not anticipated. In addition, claims 16 and 17 are separately and independently patentable in view of their respective requirements concerning the thickness of the silicon segment. Claim 16 is representative.

As with claims 6, 7, and 12-15, the Office has failed to attempt a *prima facie* case against claim 16.³² In this instance, the Office has neglected to address claim 16 and, therefore, has not identified wherein claimed silicon segment thicknesses are

³¹See Seciton VIII(D), *supra*, for the burden on the Office to establish a *prima facie* case of anticipation.

³²See Seciton VIII(D), *supra*, for the burden on the Office to establish a *prima facie* case of anticipation.

disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose the claimed thicknesses of a silicon segment. The burden is upon the Office to establish a *prima facie* case of anticipation and this burden has not been carried. Consequently, Temple et al. do not anticipate the Group IX claims (claims 16 & 17).

J. THE GROUP X CLAIMS (claims 18-21) ARE NOT ANTICIPATED

Claims 18-21 each depend from claim 13 and are not anticipated by Temple et al. for the same reasons claim 13 is not anticipated. In addition, claims 18-21 are separately and independently patentable in view of their respective requirements concerning the distance between the maximum concentration of minority carrier recombination centers and the front surface. Claim 21 is representative.

As with claims 6, 7, and 12-17, the Office has failed to attempt a *prima facie* case against claim 21.³³ In this instance, the Office has neglected to address claim 21 and, therefore, has not identified wherein the claimed distances between the maximum concentration of minority carrier recombination centers and the front surface are disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose the claimed distances between the maximum concentration of minority carrier recombination centers and the front surface. The burden is upon the Office to establish a *prima facie* case of anticipation and this burden has not been carried. Consequently, Temple et al. do not anticipate the Group X claims (claims 18-21).

K. CLAIM 22 IS NOT ANTICIPATED

Claim 22 depends from claim 13 and is not anticipated by Temple et al. for the same reasons claim 13 is not anticipated. In addition, Claim 22 is separately and independently patentable in view of its respective requirement that the front surface of the silicon segment is polished.

³³See Seciton VIII(D), *supra*, for the burden on the Office to establish a *prima facie* case of anticipation.

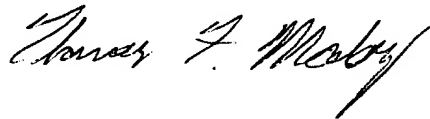
As with claims 6, 7, and 12-21, the Office has failed to attempt a *prima facie* case against claim 22.³⁴ In this instance, the Office has neglected to address claim 22 and, therefore, has not identified wherein the claimed silicon segment with a polished surface is disclosed by Temple et al. The Office has not because it cannot - Temple et al. do not disclose a silicon segment with a polished surface. The burden is upon the Office to establish a *prima facie* case of anticipation and this burden has not been carried. Consequently, Temple et al. do not anticipate claim 22.

L. CONCLUSION

For the foregoing reasons, appellants respectfully submit claims 1-22 are patentable over the Temple et al. publication and request that the rejection of these claims as being unpatentable under 35 U.S.C. § 102(b) be reversed.

A check for \$1,760.00 is enclosed (\$320.00 for the appeal brief fee specified under 37 CFR 1.17(c) and \$1,440.00 for a four month extension of time). The Commissioner is hereby authorized to charge any additional fees which may be required to Deposit Account No. 19-1345.

Respectfully submitted,



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³⁴See Seciton VIII(D), *supra*, for the burden on the Office to establish a *prima facie* case of anticipation.

APPENDIX
PENDING CLAIMS ON APPEAL

We claim:

1. A single crystal silicon segment having two major, generally parallel surfaces, one of which is the front surface of the segment and the other of which is the back surface of the segment, a central plane between the front and back surfaces, a circumferential edge joining the front and back surfaces, a surface
5 layer which comprises a first region of the segment below the front surface and a distance, D_1 , as measured from the front surface and toward the central plane, and a bulk layer which comprises a second region of the segment between the central plane and the first region, the segment being characterized in that
the segment has a non-uniform distribution of minority carrier
10 recombination centers, with the concentration of the centers in the bulk layer being greater than the concentration in the surface layer and with the centers having a concentration profile in which the peak density of the centers is at or near the central plane with the concentration generally decreasing from the position of peak density in the direction of the front surface of the segment.
2. The segment of claim 1 having a carbon concentration which is less than about 1×10^{16} atoms/cm³.
3. The segment of claim 1 having a carbon concentration which is less than about 5×10^{15} atoms/cm³.

4. The segment of claim 1 having a thickness ranging from about 500 microns to about 800 microns.

5. The segment of claim 1 having a thickness ranging from about 800 microns to about 1200 microns.

6. The segment of claim 1 wherein the concentration of minority carrier recombination centers in the surface layer is less than about 1×10^{11} centers/cm².

7. The segment of claim 1 wherein the concentration of minority carrier recombination centers in the surface layer is less than about 1×10^{13} centers/cm².

8. The segment of claim 1 wherein the distance D_1 is at least about 10 microns.

9. The segment of claim 1 wherein the distance D_1 is at least about 30 microns.

10. The segment of claim 1 wherein the distance D_1 is at least about 50 microns.

11. The segment of claim 1 wherein the distance D_1 is at least about 100 microns.

12. The segment of claim 1 wherein the front surface is polished.

13. A single crystal silicon segment containing minority carrier recombination centers and having two major, generally parallel surfaces, one of which is the front surface of the segment and the other of which is the back surface of the segment, a central plane between the front and back surfaces, the
5 recombination centers having a non-uniform distribution between the front and back surfaces with a maximum concentration of the recombination centers being in a region which is between the front surface and the central plane and nearer to the front surface than the central plane, the concentration of the recombination centers increasing from the front surface to the region of
10 maximum concentration and decreasing from the region of maximum concentration to the central plane.

14. The segment of claim 13 having a carbon concentration which is less than about 1×10^{16} atoms/cm³.

15. The segment of claim 13 having a carbon concentration which is less than about 5×10^{15} atoms/cm³.

16. The segment of claim 13 having a thickness ranging from about 500 microns to about 800 microns.

17. The segment of claim 13 having a thickness ranging from about 800 microns to about 1200 microns.

18. The segment of claim 13 wherein the maximum concentration of recombination centers is within about 5 microns from the front surface of the segment.

19. The segment of claim 13 wherein the maximum concentration of recombination centers is within about 10 microns from the front surface of the segment.

20. The segment of claim 13 wherein the maximum concentration of recombination centers is within about 20 microns from the front surface of the segment.

21. The segment of claim 13 wherein the maximum concentration of recombination centers is within about 40 microns from the front surface of the segment.

22. The segment of claim 13 wherein the front surface is polished.

LEXSEE 212 F.3d 1272

ADVANCED DISPLAY SYSTEMS, INC., Plaintiff-Appellee, and BAO GANG WU, Third Party Defendant-Appellee, v. KENT STATE UNIVERSITY and KENT RESEARCH CORPORATION, Defendants/Third Party Plaintiffs-Appellants, and KENT DISPLAY SYSTEMS, INC., Defendant/Third Party Plaintiff-Appellant.

99-1012, 99-1013

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

212 F.3d 1272; 2000 U.S. App. LEXIS 10995; 54 U.S.P.Q.2D (BNA) 1673

May 18, 2000, Decided

SUBSEQUENT HISTORY:

[**1]

Rehearing Denied August 24, 2000, Reported at: 2000 U.S. App. LEXIS 23413; 2000 U.S. App. LEXIS 23412. Certiorari Denied March 5, 2001, Reported at: 2001 U.S. LEXIS 1997. Counsel Amended July 27, 2001.

PRIOR HISTORY:

Appealed from: United States District Court for the Northern District of Texas. Judge Jeffrey A. Kaplan.

DISPOSITION:

REVERSED-IN PART, VACATED-IN-PART, AND REMANDED.

COUNSEL:

Kevin C. Nash, McKool Smith, P.C., of Dallas, Texas, argued for plaintiff-appellee and third party defendant-appellee. Addendum to the Court's Decision, McKool Smith, listed as counsel for ADS, did not become involved in the proceeding until after the trial of the case, Reported at: 2000 U.S. App. LEXIS 15830. With him on the brief was C. Michael Clark, Attorney at Law, of Corinth Texas.

Richard J. Hoskins, Schiff Hardin & Waite, of Chicago, Illinois, argued for defendants/third party plaintiffs-appellants. With him on the brief were Patricia J. Thompson and Julie L. Brown. Of counsel on the brief was Ray L. Weber, Renner, Kenner, Grieve, Bobak, Taylor & Weber, of Akron, Ohio. Of counsel were V. James Adduci, II, and Michael L. Doane, Adduci, Mastriani & Schaumberg, L.L.P., of Washington, DC.

JUDGES:

Before PLAGER, SCHALL, and GAJARSA, Circuit Judges.

OPINION BY:

GAJARSA

OPINION:

[*1275]

GAJARSA, Circuit Judge.

DECISION

This is an appeal from the judgment of the United States District Court for the Northern District of Texas, entered on a jury verdict, in a consolidated declaratory judgment and patent infringement action relating to U.S. Patent No. 5,453,863 (the "West patent"). Advanced Display Systems, Inc. ("ADS") [**2] filed a complaint in the Northern District of Texas seeking a declaratory judgment of invalidity of the West patent. Kent State University ("KSU"), an assignee of the West patent, and licensees Kent Research Corporation ("KRC") and Kent Display Systems, Inc. ("KDS") (collectively "Kent") then filed an infringement action, and the two cases were consolidated with Kent as the nominal defendant and ADS as the nominal plaintiff. The parties agreed to have a magistrate judge preside over the jury trial. Following the two-week trial, the jury found that the West patent was invalid for anticipation and obviousness and not infringed by ADS. Kent then moved for a new trial on all the issues in light of newly discovered evidence. Kent also moved for a new trial on anticipation, alleging an erroneous jury instruction. In addition, Kent filed a motion for sanctions against ADS's counsel for withholding evidence during discovery. The magistrate judge denied all of these motions. On appeal, we hold that prejudicial legal error tainted the jury instruction, we vacate the judgment, and remand for a new trial on anticipation. We also remand for a new trial on obviousness and infringement in light of [**3] the newly discovered evidence. Finally, we reverse the magistrate judge's ruling on the motion for sanctions.

BACKGROUND

Since 1965, scientists at KSU's Liquid Crystal Institute ("LCI") have been researching the various properties and applications of liquid crystal materials. An important area of research focused on liquid crystal displays ("LCDs"). A typical LCD consists of a sandwich of liquid crystal material between two glass substrates. An electrical driver n1 connects to the sandwich in order to stimulate or address the liquid crystal material, thereby creating readable numerical or alphabetical characters. Manufacturers of electro-optic products, [*1276] such as digital watches and notebook computers screens, use LCDs to display images and information.

n1 An electrical driver is a device in which a power supply connects to electrodes, active matrices, and multiplexing circuits.

Traditionally, LCDs were constructed by combining varying concentrations of liquid crystal materials and polymers. For example, one [**4] method for creating LCDs involved evaporating water from an aqueous emulsion of liquid crystal material in a solution of water-soluble polymer. Another method involved phase separation of liquid crystal from a homogenous solution with a synthetic resin to generate a liquid crystal phase blended with a polymer phase. Those methods, however, were expensive and entailed complex manufacturing processes. In addition, the presence of polymers created a haze effect that obstructed visibility of the displayed information when the LCDs were viewed from oblique angles.

In early 1992, Dr. John West ("West"), director of LCI, began experimenting with techniques for developing polymer-free LCDs. West eventually developed a new, polymer-free LCD using cholestric visible materials. n2 West determined that applying an electric field pulse of sufficient duration and voltage to cholestric visible material creates a contrast between the material's light reflecting and light scattering textures, thereby enabling a stable image display. West further found that a stable image could be sustained through a single electric field pulse rather than continuous application of an electric field. Thus, through [**5] the unique use of cholestric visible materials, West achieved the advantages of prior LCDs without the drawbacks attendant to the use of polymers.

n2 Cholestric visible material, also referred to as chiral nematic material, has a positive dielectric anisotropy and a pitch length effective to reflect light in the visible spectrum. Positive dielectric anisotropy refers to the material's ability to align parallel to an applied electric field.

On May 4, 1993, West and his colleague, Dr. Deng-Ke Yang, filed a patent application covering their polymer-free device and a method for stimulating it. On September 26, 1995, the application matured into the West patent. West then assigned the patent to KSU, which through its licensing arm KRC, subsequently licensed the patent to KDS.

In February 1992, Dr. Bao Gang Wu ("Wu"), a former KSU student and colleague of West, formed ADS. In June 1993, Jiamini Gao ("Gao"), ADS's vice-president of research and development, secured a written formula for Kent's cholestric LCD. Even [**6] with knowledge of that formula, however, ADS failed to develop a functional LCD device because it could not construct an effective electrical driver.

In early 1994, Dr. Zvi Yaniv ("Yaniv"), then president of KDS and a former classmate of Wu, visited ADS and demonstrated a prototype of Kent's cholestric LCD and its electrical driver. Following the demonstration, Yaniv went to lunch with Wu, leaving the prototype at ADS's offices. Seizing the opportunity, Gao clandestinely removed the prototype from its box and brought it into an ADS laboratory. Gao then instructed a group of ADS engineers, including Victor Zhou ("Zhou"), to disassemble the prototype, photograph its various components, and re-assemble it in such a manner as to avoid any indication of tampering. Throughout this process, Gao urged his employees to work quickly to avoid detection because he knew the implication of the theft.

Prior to Yaniv's visit, ADS failed to develop an operational, polymer-free LCD through its independent efforts. Equipped with the photographs of Kent's prototype, however, ADS replicated Kent's cholestric LCD and electrical driver within a month. On April 11, 1994, ADS also filed a patent application [**7] for a polymer-free LCD based on the equivalent subject matter that had been photographed and copied during the surreptitious disassembly of Kent's prototype. The patent listed Wu, Gao, Zhou, and Yao-Dong Ma as inventors. [*1277] While ADS's application was pending, the West patent issued, and the Patent and Trademark Office Examiner rejected ADS's claims directed exclusively to polymer-free LCDs as anticipated by the West patent. ADS consequently amended and limited its claims to cover the application of surface treatment in polymer-free LCDs. The ADS application eventually matured into U.S. Patent No. 5,625,477 on April 29, 1997.

In early 1996, Kent learned that ADS was promoting a polymer-free LCD and notified ADS that it intended to enforce the West patent. While Kent and ADS were discussing licensing arrangements, ADS filed a complaint in the Northern District of Texas seeking a declaratory judg-

ment of invalidity of the West patent. After settlement negotiations failed, Kent sued ADS for infringement of the West patent, and the cases were consolidated in the Northern District of Texas.

Concurrent with discovery in the present case, ADS filed suit in Texas state court against USA Display, [**8] a company with several former ADS employees, alleging trade secret misappropriation. ADS's attorneys in the USA Display suit and in the present case were from the same law firm. During discovery in the USA Display suit, Zhou's deposition was taken. The pertinent parts of the deposition are set forth below.

Q: Can you describe for me or explain to me what Exhibit 3 is?

A: This is a picture taken by an employee in ADS. I cannot remember who took it, but I know Dr. Zvi Yaniv [and Kent] also develop a similar display, they call [theirs] bistable display, but in ADS they call multistable display. But ADS did not know how to design the driver for this device. So one day Dr. Zvi Yaniv visited ADS with a sample, and [Kent] have [a] completed driver And Dr. Zvi Yaniv gave to Jianmi Gao, who is the vice president of ADS and boss of R & D group, so he opened Dr. Zvi Yaniv[s] ... sample, and took this picture, while at that time Dr. Zvi Yaniv was not there. So [Yaniv] did not know.

....

Q: What is this picture of?

A: This picture is the picture for the sample brought by Zvi Yaniv.

....

Q: And [Yaniv] gave [the sample to ADS]? [**9]

A: He not gave a sample, he just waited at ADS with a sample and -

Q: Then he left?

A: No, he did not [leave], he showed the sample. But during this time period he left and [Gao] opened the box and took the picture.

....

Q: You were there?

A: Yeah, I was there.

Q: Did you open up the driver?

A: Yes. I was an employee there. I did whatever my boss told me to do.

....

Q: Where was Mr. Zvi Yaniv [at that time]??

A: Well, we are taking picture and I don't know who he was talking to, but he was somewhere within the building or maybe left for lunch. ... I just know that [Gao] want us to take the picture, and we took it.

....

Q: Prior to the meeting in which the Kent State product was taken apart and photographed at ADS ... was ADS working on a similar type of display?

A: Yeah. They were trying to develop the similar thing.

Q: You said ... that ADS was trying to but had not succeeded in making a driver for [their LCD]; is that correct?

A: Yes that's correct.

.... [**1278]

Q: Would you please describe the difficulties?

A: Yeah, we did not know how to drive the new display since [**10] the driving is another difficult part for designing the whole display. We did not know how to drive it, what kind of waveform We did not know that.

Q: [Was] exhibit 3 [helpful]?

A: Right. Exhibit 3. This is very big help. So since then we knew, we start to know how to design the driver.

....

Q: Before the photograph was made. How was [Gao] involved in trying to make the driver?

A: We tried [for] a long time - we tried to understand how to drive it, but were not successful.

Q: Did [Gao know]?

A: He had some idea but all not successful.

Q: None of his ideas were?

A: No. We didn't even-

....

Q: [During] the time period before the Kent State product was taken apart and photographed in the ADS lab. ... [Was] ADS ... trying to make a driver?

A: Right.

Q: And failed. Could not do it.

A: No. They did not have an idea at that time.]

....

Q: Why did ADS need a driver for [its LCD]?

A: Without the driving circuit, no one [is] interested in that [LCD]. That is just a piece of glass. You have to make

the life.

....

Q: Do you know when ... Mr. Gao brought [**11] you the formula for the Kent State cholestric material?

....

A: Before June.

Q: Before June of what?

A: June '93.

Q: Before Mr. Gao gave you the formulation, had ADS succeeded in making any [LCD] cholestric materials?

A: I did not see it.

Q: After he gave you what he told you to be the Kent State formula, were you successful in making cholestric [LCD] material?

A: Yeah.

Q: You were?

A: After he gave me [the Kent State formulation].

Q: How long did it take you after he gave you the formulation?

A: Few days.

....

Q: All right. Now after you used the Kent State formulation to make the [LCD], your next problem was the driver?

A: Yeah.

Q: And on the day that Zvi Yaniv visited ADS and brought the [Kent prototype] module to show everybody, that the photographs were made, did Zvi Yaniv know the module was being photographed?

A: [Gao] ... told us to be quick. Don't let Dr. Zvi Yaniv know

....

Q: So after the photographs were made, what happened to the [Kent prototype]? Was it reassembled?

A: Reassembled and then gave [it back to Yaniv].

Q: How long did [**12] it take to photograph it?

A: Pretty quick.

Q: [Gao] told you to be quick, didn't he?

A: Yeah, pretty quick.

.... [**1279]

Q: After the Kent State [prototype] was copied, were you successful in making a driver?

A: Yes. After about a month or so.

Q: How did your driver compare to the Kent State driver?

A: We changed the microprocessor but we used the driver. The driver is the key part, the most important to this.

....

Q: The cholestric material that was developed at ADS was based upon the formulas from Kent State?

A: Yes.

Q: And the driver on the [LCD] at ADS was based upon the driver from Kent State?

A: Yeah, at that time, yes.

....

Q: You didn't know whether Kent State or ADS owned the technology, did you?

A: I know—technically I know the basics are the same.

Q: The basics of the Kent State—

A: The chemistry mixture and the way they make the cell are the same.

Q: As Kent State and ADS?

A: Right. ...]

....

Q: Why didn't [ADS] just buy the functioning [driver] ... ?

A: It is not market available, I think. We cannot buy it.

....

Q: Is [**13] it true that there are hundreds of shelf drivers?

A: Thousands and thousands.

Q: And so theoretically you could begin today to test and test drivers for years and not, other than by accident, hit the right driver?

A: By luck you may get it in a second. If not luck, it takes 10 years, it takes your life.

Q: So in order to find one that [properly charged the LCD], you either do random experimentation to find a shelf driver or invent or create a new driver?

A: Yeah.

Q: Or use somebody else's driver?

A: Right.

....

Q: None of [the drivers] was built before ADS got this photograph?

A: Right.

Q: So the entire system that makes this was still to be done?

A: Right.

Q: And was anybody working on designing this system?

A: We did not know how to design We don't know.

....

Q: [Dr. Wu] told you to change things around so that he could get out—away from an earlier patent?

A: He tried to find us a new way to build another kind of [polymer-free LCD] so we can avoid a conflict with Kent State, yes.

....

Q: Why didn't you find a new way?

A: It is very hard. ... We did not [**14] have the time, we did not have the money to test everything.

During this testimony, ADS's attorney attempted to terminate the deposition and telephoned the presiding judge to request a protective order. The judge denied ADS's request but suggested that both parties keep the deposition confidential until ADS filed a formal motion for a protective order. ADS, however, never filed the motion and eventually abandoned the suit. ADS's attorney also instructed the court reporter not to prepare a transcript of the deposition.

During discovery in the present case, ADS failed to disclose to Kent the events that took place during Yaniv's lunch with Wu in spite of various demands made upon [**1280] ADS. In particular, Kent served upon ADS a document request for "all documents that refer or relate to any evaluation, analysis, examination, testing, performance, or investigation of any light-modulating reflective device comprising [cholestric material] or any compound thereof made by KDS, the [LCI], or any third party." ADS's attorneys, however, failed to notify Kent about Zhou's identity or the deposition in the USA Display suit. ADS's attorneys also failed to produce the photograph of Kent's prototype, [**15] instead characterizing it as "Attorney Work Product" in the privilege log. n3

n3 At oral argument, ADS's counsel claimed that the photograph in its possession was attorney work product because it was a copy made by an attorney of the original photograph.

At the end of discovery, all pre-trial issues regarding claim construction, validity, and infringement were submitted to a Special Master, who construed the claims and recommended a denial of ADS's motion for summary judgment on the issue of anticipation. The magistrate judge then adopted the Special Master's report, and this case proceeded to a jury trial.

At trial, both parties presented evidence and expert testimony concerning anticipation, obviousness, and infringement. On the issue of anticipation, in particular, ADS argued that the West patent was anticipated by U.S. Patent No. 4,097,127 (the "Haas patent") and the documents incorporated by reference therein. The documents incorporated into the Haas patent disclosed hundreds of different liquid crystal [**16] materials that could reflect visible and infrared light. From that body of materials, ADS contended, with perfect hindsight, that the combination of the Haas patent and three particular liquid crystal materials taught every element of the West patent.

Into the first week of trial, Kent was advised by Mr. Kan Xu, a former ADS employee and president of USA Display, that Zhou possessed information relevant to the case. Then, more than one week into trial and without an opportunity to probe Zhou's knowledge, Kent called Zhou to testify about how ADS disassembled Kent's prototype and photographed it. The photograph was also finally provided to Kent and admitted into evidence. At this stage, however, Kent still did not possess a copy of Zhou's deposition transcript from the USA Display suit.

At the close of evidence, Kent's attorney did not make a motion for Judgment as a Matter of Law ("JMOL") on either the validity or infringement issues. On the issue of anticipation, the magistrate judge instructed the jury that their role was to determine whether and to what extent material from other documents was incorporated by reference into the Haas patent. Kent's attorney objected to this instruction, [**17] but the magistrate judge overruled the objection and included the instruction in his final charge to the jury. The magistrate judge also provided the following definition of incorporation by reference:

The purpose of incorporation by reference is to make one document become part of another document by referring to the form in the latter in such a manner that it is apparent that the cited document is part of the referencing document as if it were fully set out therein.

After initial deliberations, the jury was unable to resolve the issues of anticipation and obviousness. The magistrate judge, however, instructed the jurors to continue deliberating until they reached a verdict. Two hours later, the jury determined that the West patent was invalid for anticipation and obviousness and not infringed.

Following the jury verdict, Kent's attorney again failed to make a motion for JMOL. Rather, having finally received Zhou's deposition transcript, Kent filed a motion for a new trial based on (1) newly discovered evidence in view of the deposition, and (2) ADS's withholding of relevant evidence during discovery. KDS also filed a motion seeking the imposition of sanctions [*1281] against ADS and its attorneys for improper conduct during discovery. Regarding Kent's motion for a new trial, the magistrate judge found that Zhou's deposition was merely cumulative of his testimony at trial. The magistrate judge also determined that Kent was not prejudiced by the late disclosure of the photograph and the evidence relating to ADS's disassembly of Kent's prototype, because Kent was able to present that evidence to the jury. As for sanctions, the magistrate judge denied KDS's motion but remarked that he was "deeply concerned" with the conduct of ADS's attorneys and indicated that he would consider further disciplinary action.

ANTICIPATION

Anticipation is a question of fact, see *In re Graves*, 69 F.3d 1147, 1151, 36 U.S.P.Q.2D (BNA) 1697, 1700 (Fed. Cir. 1995), that this court reviews for substantial evidence on appeal from a jury trial, see *Baxter Int'l, Inc. v. McGaw, Inc.*, 149 F.3d 1321, 1332, 47 U.S.P.Q.2D (BNA) 1225, 1233 (Fed. Cir. 1998). However, a party's failure to make a motion for JMOL, see Fed. R. Civ. P. 50(b), at any phase of the litigation precludes an appellate court from reviewing the sufficiency of the evidence underlying the jury verdict. [*19] See *Biodex Corp. v. Loredan Biomedical Inc.*, 946 F.2d 850, 862, 20 U.S.P.Q.2D (BNA) 1252, 1261 (Fed. Cir. 1991) (holding that failure to make a post-verdict JMOL forecloses appellate review of the jury's factfinding); *Jurgens v. McKasy*, 927 F.2d 1552, 1557, 18 U.S.P.Q.2D (BNA) 1031, 1035 (Fed. Cir. 1991) (requiring a party to make a motion for directed verdict in order to challenge the sufficiency of the evidence on appeal); see also 9A Charles Alan Wright & Arthur R. Miller, *Federal Practice & Procedure* § 2536 (2d ed. 1994) (explaining that the rationale for the rule is that a party's failure to make a motion for JMOL works as a concession that sufficient evidence exists for a jury to reach a verdict). In the present case, because Kent did not make a motion for JMOL at the close of evidence or following the jury verdict, we will not disturb the jury's factual determinations.

Notwithstanding the absence of a motion for JMOL, a party may still challenge a jury verdict by establishing that the judge committed legal error or abused his discretion. See *Biodex*, 946 F.2d at 854, 20 U.S.P.Q.2D (BNA) at 1255 (stating that jury verdict may be altered if the instructions [*20] "were incorrect or incomplete

as given"); *Jurgens*, 927 F.2d at 1557-58, 18 U.S.P.Q.2D (BNA) at 1036 (providing that, despite the absence of a JMOL motion, party could challenge judgment based on jury instructions). On appeal, Kent contends that the magistrate judge committed legal error by instructing the jury to determine what material was incorporated by reference into the Haas patent for purposes of anticipation. n4 A party seeking to alter a judgment based on erroneous jury instructions must establish that (1) it made a proper and timely objection to the jury instructions, (2) those instructions were legally erroneous, see *Biodex*, 946 F.2d at 853-54, 20 U.S.P.Q.2D (BNA) at 1254-55, (3) the errors had prejudicial effect, see *Jamesbury Corp. v. Litton Indus. Prod., Inc.*, 756 F.2d 1556, 1558, 225 U.S.P.Q. (BNA) 253, 255 (Fed. Cir. 1985), and (4) it requested alternative instructions that would have remedied the error. See *Delta-X Corp. v. Baker Hughes Prod. Tools, Inc.*, 984 F.2d 410, 415, 25 U.S.P.Q.2D (BNA) 1447, 1450-51 (Fed. Cir. 1993).

n4 Kent also filed a motion for a new trial on anticipation in light of the newly discovered evidence. Anticipation presents a question of what a prior art publication teaches, and because the Haas patent was available to Kent during trial, we do not understand Kent's motion for a new trial based on newly discovered evidence to pertain to the anticipation issue.

[**21]

Pursuant to Rule 51 of the Federal Rules of Civil Procedure, a party must object to jury instructions "before the jury retires to consider its verdict, stating distinctly the matter objected to and the [*1282] grounds for objection." Fed. R. Civ. P. 51. Because objection to a jury instruction involves a procedural matter that is not intimately related to this court's exclusive jurisdiction, we look to the regional circuit law to ascertain the requirements necessary to comply with the rule. See *Lummas Indus., Inc. v. D.M. & E., Corp.*, 862 F.2d 267, 270, 8 U.S.P.Q.2D (BNA) 1983, 1985 (Fed. Cir. 1988) (applying Fourth Circuit law to determine whether a party timely objected to a jury instruction). According to Fifth Circuit law, a party satisfies Rule 51 by objecting to an instruction prior to the jury's deliberation and stating the reason for its objection. See *A.B. Baumstimler v. Rankin*, 677 F.2d 1061, 1069, 215 U.S.P.Q. (BNA) 575, 581-82 (5th Cir. 1982). Here, Kent objected before the magistrate judge charged the jury and explained that the instruction was erroneous because the jury should not decide what material was incorporated by reference. Kent's objection therefore complied [*22] with Fifth Circuit law.

Whether a jury instruction is legally erroneous is a

question of law. See *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1570, 24 U.S.P.Q.2D (BNA) 1401, 1411 (Fed. Cir. 1992). When reviewing an instruction for legal error, this court reads the instructions as a whole and considers them in light of the entire charge to the jury. See *United States Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1564, 41 U.S.P.Q.2D (BNA) 1225, 1232 (Fed. Cir. 1997) ("Jury instructions are reviewed for correctness, with due attention to their clarity, objectivity, and adequacy, taken as a whole."); *Biodex*, 946 F.2d at 854, 20 U.S.P.Q.2D (BNA) at 1255 (noting that this court reviews jury instructions in their entirety). Here, the relevant inquiry is whether the magistrate judge committed legal error in his jury instruction on anticipation.

Section 102(b) provides that "a person shall be entitled to a patent unless the invention was patented or described in a printed publication ... more than one year prior to the date of the application." 35 U.S.C. § 102(b) (1994). Accordingly, invalidity by anticipation requires that [**23] the four corners of a single, prior art document describe every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation. See *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 U.S.P.Q.2D (BNA) 1943, 1947 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1479, 31 U.S.P.Q.2D (BNA) 1671, 1673 (Fed. Cir. 1994). Material not explicitly contained in the single, prior art document may still be considered for purposes of anticipation if that material is incorporated by reference into the document. See *Ultradent Prods., Inc. v. Life-Like Cosmetics, Inc.*, 127 F.3d 1065, 1069, 44 U.S.P.Q.2D (BNA) 1336, 1339-40 (Fed. Cir. 1997) (holding that material incorporated by reference into a document may be considered in an anticipation determination). Incorporation by reference provides a method for integrating material from various documents into a host document—a patent or printed publication in an anticipation determination—by citing such material in a manner that makes clear that the material is effectively part of the host document as if it were explicitly [**24] contained therein. See *General Elec. Co. v. Brenner*, 132 U.S. App. D.C. 323, 407 F.2d 1258, 1261-62, 159 U.S.P.Q. (BNA) 335, 337 (D.C. Cir. 1968); *In re Lund*, 54 C.C.P.A. 1361, 376 F.2d 982, 989, 153 U.S.P.Q. (BNA) 625, 631 (CCPA 1967). To incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents. See *In re Seversky*, 474 F.2d 671, 674, 177 U.S.P.Q. (BNA) 144, 146 (CCPA 1973) (providing that incorporation by reference requires a statement "clearly identifying the subject matter which is incorporated and where it is to be found"); *In re Saunders*,

58 C.C.P.A. 1316, 444 F.2d 599, 602-03, 170 U.S.P.Q. (BNA) 213, 216-17 (CCPA 1971) (reasoning that a rejection for anticipation is appropriate only if one reference "expressly incorporates a particular part" of another reference); *National Latex [*1283] Prods. Co. v. Sun Rubber Co.*, 274 F.2d 224, 230, 123 U.S.P.Q. (BNA) 279, 283 (6th Cir. 1959) (requiring a specific reference to material in an earlier application in order have that material considered part of a later [**25] application); cf. *Lund*, 376 F.2d at 989, 153 U.S.P.Q. (BNA) at 631 (holding that a one sentence reference to an abandoned application is not sufficient to incorporate material from the abandoned application into a new application).

Whether and to what extent material has been incorporated by reference into a host document is a question of law. See *Quaker City Gear Works, Inc. v. Skil Corp.*, 747 F.2d 1446, 1453-54, 223 U.S.P.Q. (BNA) 1161, 1166 (Fed. Cir. 1984) (reasoning that whether a document is incorporated by reference into a patent presents a question of law when determining enablement). As the court observed in *General Electric*, the doctrine of incorporation by reference has its roots in the law of wills and contracts. 407 F.2d at 1260, 159 U.S.P.Q. (BNA) at 337. In those areas of jurisprudence, whether material is incorporated by reference presents a question of law. See 11 Richard A. Lord, *Williston on Contracts* § 30:25 (4th ed. 1999) (observing that terms of a contract may be expressed in separate documents and the determination of which terms are incorporated into the contract is a question of law); George Taylor Bogert, *The Law of Trusts* [**26] and Trustees, § 105 (2d ed. rev. 1984) (describing the use of incorporation by reference to supply additional terms to a will and providing cases holding that whether terms are incorporated into a will is a question of law); see also *Topro Servs., Inc. v. McCarthy W. Constr., Inc.*, 827 F. Supp. 666, 667 (D. Colo. 1993) ("Whether the Prime Contract, or any part of it, was incorporated by reference into the Subcontract is a question of law."); *Siler v. Dorsett*, 108 N.C. 300, 302, 12 S.E. 986, 987 (N.C. 1891) (holding that court decides whether a will incorporated material from other documents). Logic therefore requires that incorporation by reference in the field of patent law is also a question of law. Further, the standard of one reasonably skilled in the art should be used to determine whether the host document describes the material to be incorporated by reference with sufficient particularity.

Moreover, no necessary contradiction exists given that incorporation by reference is a question of law while anticipation is a question of fact. Anticipation, put simply, requires that every element of the claimed invention was previously "described [**27] in a single reference." *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991) (emphasis added). Thus,

if incorporation by reference comes into play in an anticipation determination, the court's role is to determine what material in addition to the host document constitutes the single reference. The factfinder's role, in turn, is to determine whether that single reference describes the claimed invention.

Turning now to the present case, ADS argued at trial that the West patent was anticipated by the Haas patent and the material incorporated therein from other documents. The magistrate judge charged the jury with the task of determining what material was incorporated by reference. As explained above, it was the duty of the magistrate judge to determine, as a matter of law, whether and what material was incorporated by reference into the Haas patent. Thus, we conclude that instructing the jury to make that determination constituted legal error.

We next consider whether that error was prejudicial. Prejudicial legal error exists when it "appears to the court [that the error is] inconsistent with substantial justice." Fed. R. Civ. P. 61. In the present case, determining what material was incorporated by reference into the Haas patent was a critical question of law for the magistrate judge to resolve before submitting the factual issue of anticipation to the jury. Indeed, during trial, ADS never contended that the material explicitly set forth in the Haas patent alone would anticipate the [*1284] West patent. Rather, ADS's anticipation argument hinged on the combination of the Haas patent and the material potentially incorporated therein. The magistrate judge, however, failed to address the legal question; instead, he left that determination for the jury. This misallocation of responsibility goes to the core of an anticipation determination when, if incorporation by reference is at issue, the court must determine what material constitutes the single, prior art document. Consequently, because the instruction vitiated Kent's right to have a pivotal legal question resolved by the court, we hold that the legal error was prejudicial.

We further hold that Kent's objection would have cured the defect. In the present case, the proper jury instruction on incorporation by reference would have been no instruction at all. Thus, [*29] Kent's request that the question of incorporation by reference not be submitted to the jury would have ameliorated the error.

Accordingly, given that Kent preserved its right to appeal the jury instruction and prejudicial legal error infected that instruction, we remand for a new trial on anticipation.

OBVIOUSNESS

Because Kent failed to make a motion for JMOL at any time during trial, we cannot weigh the sufficiency of the evidence underlying the jury's factual findings on

obviousness. See *Biodex*, 946 F.2d at 862, 20 U.S.P.Q.2D (BNA) at 1261. Kent, however, preserved its right to seek relief from the verdict by making a motion for a new trial, which the magistrate judge denied. See *New Idea Farm Equip. Corp. v. Sperry Corp.*, 916 F.2d 1561, 1565-66, 16 U.S.P.Q.2D (BNA) 1424, 1428 (Fed. Cir. 1990) (providing that, as an alternative to a post-verdict motion, court may grant motion for a new trial if prejudicial error occurred). This court reviews a denial of a motion for a new trial under the abuse of discretion standard. See *Motorola, Inc. v. Interdigital Tech. Corp.*, 121 F.3d 1461, 1468, 43 U.S.P.Q.2D (BNA) 1481, 1486 (Fed. Cir. 1997). To that end, we must determine [*30] whether, in the conduct of the trial, an error occurred that was so egregious as to render the trial unfair. See *DMI, Inc. v. Deere & Co.*, 802 F.2d 421, 427, 231 U.S.P.Q. (BNA) 276, 280 (Fed. Cir. 1986).

Rule 59(a) of the Federal Rules of Civil Procedure provides that a "new trial may be granted to ... any of the parties ... in an action in which there has been a trial by a jury, for any of the reasons for which new trials have heretofore been granted in actions at law in courts of the United States." Fed. R. Civ. P. 59(a); see *Blue Diamond Co. v. Charles M. Allen & Son, Inc.*, 56 F.2d 1, 3 (5th Cir. 1932) (recognizing that newly discovered evidence can give rise to a right to a new trial). Kent contends that it is entitled to a new trial due to newly discovered evidence—namely, the Zhou deposition. Determining whether the newly discovered evidence warrants a new trial entails the following three-prong analysis: (1) the probability that the evidence would have changed the outcome of the trial; (2) whether the evidence could have been discovered earlier through the moving party's due diligence; and (3) whether the evidence is merely cumulative [*31] or impeaching. See *Farm Credit Bank v. Guidry*, 110 F.3d 1147, 1155 (5th Cir. 1997); *Diaz v. Methodist Hosp.*, 46 F.3d 492, 495 (5th Cir. 1995).

This court measures whether the newly discovered evidence is potentially outcome determinative by reference to our obviousness jurisprudence. A claimed invention is invalid for obviousness if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (1994); see *Graham v. John Deere Co.*, 383 U.S. 1, 13-14, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966). Obviousness is ultimately a question of law that rests on [*1285] underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective considerations of nonobviousness. See *Graham*, 383 U.S. at 17-18; *Robotic Vision Sys., Inc. v. View Eng'g*,

Inc., 189 F.3d 1370, 1376, 51 U.S.P.Q.2D (BNA) 1948, 1953 (Fed. Cir. 1999). [****32**] Objective considerations such as failure by others to solve the problem and copying, see *Graham*, 383 U.S. at 17-18, "may often be the most probative and cogent evidence" of nonobviousness. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538, 218 U.S.P.Q. (BNA) 871, 879 (Fed. Cir. 1983).

In the present case, Zhou's deposition furnishes persuasive evidence that the West patent is nonobvious by describing ADS's repeated failures to design the claimed invention. In his deposition, Zhou testified that ADS was entirely unsuccessful in developing the cholestric visible material through independent research. Zhou also explained that ADS "tried for a long time" to build an electrical driver, but its efforts "were all not successful." Zhou further detailed how ADS's attempts to develop a polymer-free LCD met with failure and that ADS "did not know how to design" the device until it copied the claimed invention. In addition, Zhou testified that, even after gaining access to the claimed invention, ADS was unable to design around the West patent because such a task was time consuming and "very hard."

Our case law supports Kent's view that such evidence of failed attempts [****33**] by others could be determinative on the issue of obviousness. For example, in *Alco Standard Corp. v. Tennessee Valley Authority*, this court held that when evidence in the record fully supports a finding that others in the industry failed to solve the problem, then objective considerations "may ... establish that an invention appearing to have been obvious in light of the prior art was not." 808 F.2d 1490, 1500-01, 1 U.S.P.Q.2D (BNA) 1337, 1344-45 (Fed. Cir. 1986). Similarly, in *Intel Corp. v. United States International Trade Commission*, we reasoned that an accused infringer's inability to develop a product made possible by the claimed invention indicated nonobviousness. 946 F.2d 821, 835, 20 U.S.P.Q.2D (BNA) 1161, 1173 (Fed. Cir. 1991); see also *Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1574, 24 U.S.P.Q.2D (BNA) 1321, 1333-34 (Fed. Cir. 1992) (reasoning that competitors' failure to develop the patented invention suggested nonobviousness); *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 1099, 227 U.S.P.Q. (BNA) 337, 349 (Fed. Cir. 1985) (reasoning that failure by others, including the accused infringer, to develop [****34**] the claimed invention constitutes "virtually irrefutable" evidence of nonobviousness), vacated *Dennison Mfg. Co. v. Panduit Corp.*, 475 U.S. 809, 89 L. Ed. 2d 817, 106 S. Ct. 1578 (1986) (vacating for failure to give proper deference to district court's fact finding rather than legal error).

Zhou's deposition also provides compelling evidence of nonobviousness by illustrating ADS's wholesale copy-

ing of the claimed invention. See *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 991, 6 U.S.P.Q.2D (BNA) 1601, 1608 (Fed. Cir. 1988) (reasoning that an accused infringer's close copying of the "claimed invention, rather than one in the public domain, is indicative of nonobviousness"). Indeed, Zhou's deposition reveals that ADS's device was virtually an identical replica of the claimed invention. Zhou testified that the Kent and ADS "chemistry mixtures and the ways they make the cell are the same." Underlying that comparison was Zhou's testimony that ADS developed its cholestric visible material by copying Kent's formula. Zhou also explained that ADS built its electrical driver by disassembling Kent's prototype, photographing its features, and then using the photograph [****35**] essentially as an instruction manual. The import of such copying evidence merits even greater weight in view of ADS's failure [***1286**] to develop independently the claimed invention. See *Dow Chem. Co. v. American Cyanamid Co.*, 816 F.2d 617, 622, 2 U.S.P.Q.2D (BNA) 1350, 1355 (Fed. Cir. 1987) (reasoning that an infringer's failed attempts to develop the claimed invention followed by subsequent copying of the invention supports a holding of nonobviousness); *Vandenberg v. Dairy Equip. Co.*, 740 F.2d 1560, 1567, 224 U.S.P.Q. (BNA) 195, 199 (Fed. Cir. 1984) ("The copying of an invention may constitute evidence that the invention is not an obvious one. ... This would be particularly true where the copyist had itself attempted for a substantial length of time to design a similar device, and had failed.").

Furthermore, with respect to both objective considerations, Zhou's deposition testimony constitutes highly probative evidence of nonobviousness given that after initial deliberations the jury was in equipoise on the issue of obviousness, and this newly discovered evidence could have been the tipping factor for finding the West patent to be not invalid. Thus, we find that the constellation [****36**] of facts contained in the Zhou deposition presents evidence that is potentially outcome determinative on the issue of obviousness.

We also hold that Kent exercised due diligence throughout the discovery process, but it was powerless to unearth the Zhou deposition because ADS deliberately and intentionally withheld the deposition and the photograph of Kent's prototype. In its first document request, Kent required: "All documents that refer or relate to any evaluation, analysis, examination, testing, performance, or investigation of any light-modulating reflective device comprising [cholestric material] or any compound thereof made by KDS, the [LCI], or any third party." In its interrogatories, Kent asked ADS to

Identify each communication that ADS, or its present or former ... employees ... has participated in or has knowl-

edge of that refers or relates to [Kent] or products being developed, under research, under investigation, made, sold, or offered for sale by [Kent] or to any claims asserted by any party in this lawsuit or to any allegations that ADS has made against or about [Kent]. With reference to each communication, provide ... the identity of all documents [**37] referring or relating to the communication

Any fair reading of the document request and interrogatory, coupled with ADS's duty to supplement its disclosures and responses under Rule 26(e) of the Federal Rules of Civil Procedure, required ADS to disclose the existence of the Zhou deposition and to produce the photograph of Kent's prototype.

ADS, however, effectively concealed both pieces of evidence. With regard to the deposition, ADS's counsel instructed the court reporter not to prepare a transcript and then quickly abandoned the state court suit, thereby suppressing the existence of Zhou's deposition testimony. As for the photograph, which was initially produced at the deposition, ADS characterized it as "attorney work product." As a result, by preventing Kent from examining the photograph and inquiring about how ADS came to possess it, ADS completely sealed off Kent from discovering the existence of the Zhou deposition, much less its substance.

In fact, the sole reason that Kent was able to discover that Zhou possessed crucial information was through its continued diligence. Midway through trial, Kent served a trial subpoena on Mr. Kan Xu, a former ADS employee, [**38] who then advised Kent that Zhou would be a useful witness to their case. Thus, half-way through trial and by virtue of its own effort, Kent became aware of information that ADS's counsel was obligated to disclose months earlier during the normal course of discovery. Kent, however, still could not ascertain the full scope of Zhou's knowledge because it did not receive the deposition transcript until after the jury retired to deliberate. [**1287]

We further hold that Zhou's deposition testimony is not merely cumulative or impeaching. Rather, Zhou's deposition contained a significant amount of material evidence that ADS prevented Kent from presenting at trial. For example, the jury did not hear Zhou's deposition testimony about how ADS obtained Kent's cholestric formula, used that formula to duplicate Kent's cholestric material, and then used that material in its own device; nor did the jury hear Zhou's admission that ADS's electrical driver was essentially the same as Kent's. The jury also did not hear Zhou's statements concerning the extent of ADS's failure to develop its own device or the detailed copying of Kent's prototype. Furthermore, the jury did not hear about ADS's failure to design [**39] around the claimed

invention even after it disassembled and studied Kent's prototype.

Moreover, to the extent that some overlap exists between the Zhou deposition testimony and his trial testimony, we do not find it sufficient to preclude a new trial. To find otherwise would be to prejudice the party who acts diligently and complies with the Federal Rules of Civil Procedure and to benefit the party who contravenes those rules and uses dilatory discovery tactics. Indeed, one can readily imagine a situation in which counsel conceals material evidence throughout discovery and then reveals that evidence late into the trial, thereby depriving the other party of a fair trial in the first instance as well as foreclosing the opportunity for a new trial. Such a result would be manifestly unjust.

Thus, in light of the newly discovered evidence, we remand for a new trial on the issue of obviousness.

INFRINGEMENT

As with obviousness, Kent's only viable argument to alter the non-infringement verdict is through a motion for a new trial. Because the analysis for the last two prongs of the test for a motion for a new trial is the same for obviousness and infringement, we limit our discussion to [**40] the first prong—whether the newly discovered evidence is potentially outcome determinative on the issue of infringement.

To establish infringement a party must show that the accused device contains, either literally or by equivalents, every limitation of the claimed invention. See *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1574, 40 U.S.P.Q.2D (BNA) 1481, 1489 (Fed. Cir. 1996); *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 934-35, 4 U.S.P.Q.2D (BNA) 1737, 1739-40 (Fed. Cir. 1987) (en banc). During the deposition, Zhou testified that the design of ADS's device was directly "based upon" Kent's cholestric material formula and its electrical driver circuitry. Zhou also explained that the Kent's and ADS's "chemistry mixtures and the way they make the cell are the same." Zhou further testified that ADS failed to design a device that was different from the claimed invention.

Although not itself evidence of infringement, Zhou's deposition is compelling evidence relating to infringement. Zhou was one of the engineers who worked on ADS's device and possessed an intimate understanding of the similarities between ADS's device and [**41] the claimed invention. Zhou's deposition directly addresses how ADS's electrical driver circuitry was designed and implemented. That circuitry provides a waveform to change portions of the liquid crystal. The way in which ADS's device causes the liquid crystal to switch is ma-

terial to the question of literal infringement because the West patent covers a particular method for stimulating the liquid crystal. In addition, the evidence of copying present in Zhou's deposition supports a claim of infringement under the doctrine of equivalents. See *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 612, 94 L. Ed. 1097, 70 S. Ct. 854 (1950); *Roton Barrier, Inc. v. Stanley Works*, 79 F.3d 1112, 1126, 37 U.S.P.Q.2D (BNA) 1816, 1827 (Fed. Cir. 1994). [*1288]

Furthermore, the impact of Zhou's deposition on the issue of infringement is not limited solely to the content of the deposition; rather, this evidence has ramifications that would have greatly changed the complexion of Kent's trial strategy. If Kent possessed this evidence before trial, it could have chosen to depose more witnesses—most notably Zhou, pursued different avenues of discovery, sought additional corroborating [*42] evidence, implemented different tactics during cross-examination, and so forth. In short, armed with the Zhou deposition at an early stage in discovery, Kent could have developed a different theory of the case and presented a more persuasive story at trial.

Accordingly, based on the newly discovered evidence, we remand for a new trial on infringement.

SANCTIONS

Following the jury verdict, Kent made a motion for sanctions against ADS's counsel, seeking sanctions in the form of new trial given ADS's suppression of the Zhou deposition and the photograph of Kent's prototype. The magistrate judge denied the motion but indicated that he was "deeply concerned" by the conduct of ADS's counsel. The magistrate judge also indicated that he would seriously consider taking disciplinary action under the local rules and imposing appropriate sanctions other than granting a new trial.

When reviewing a district court's decision on the propriety of imposing sanctions for misconduct during discovery, we apply the regional circuit's law. See *Seal-Flex, Inc. v. Athletic Track & Court Constr.*, 172 F.3d 836, 845, 50 U.S.P.Q.2D (BNA) 1225, 1231 (Fed. Cir. 1999). The Fifth Circuit reviews a denial [*43] of sanctions for an abuse of discretion. See *Tacon Mechanical Contractors, Inc. v. Aetna Cas. & Sur. Co.*, 65 F.3d 486, 489 (5th Cir. 1995). Although a district court possesses inherent power to sanction an attorney's bad faith conduct during litigation, see *Chambers v. NASCO, Inc.*, 501 U.S. 32, 43-46, 115 L. Ed. 2d 27, 111 S. Ct. 2123 (1991), the threshold for the imposition of such sanctions is high, see *Chaves v. M/V Medina Star*, 47 F.3d 153, 156 (5th Cir. 1995). Thus, the district court must make a specific finding of bad faith conduct in order to impose sanctions. See *id.*

From the record below, it appears to this court that ADS's development of its LCD technology consisted of deceitful and conniving machinations that amounted to nothing short of corporate espionage of a competitor's valuable technology. Regretfully, the conduct of ADS's counsel in defending such actions was equally egregious. Indeed, to say that counsel's conduct during discovery raises the collective eyebrow of this court would be to understate the severity of their transgressions.

Counsel's tactics during discovery evinced a brazen disregard for the legal [*44] process. Throughout discovery, counsel's strategy consisted of efforts to obfuscate, cover-up, and subvert evidence that was properly discoverable and responsive to Kent's requests. For example, when confronted with the bleak realization that Zhou's deposition would reveal damaging information, ADS's counsel attempted to terminate the deposition. Counsel next tried to eliminate any trace of the deposition by instructing the court reporter not to make a transcript. Counsel then failed to disclose the deposition's existence during the discovery stage of the action. Counsel further failed to list Zhou as a person having knowledge of the development of ADS's LCD technology, even though he was an engineer at ADS working on the project during those years.

Moreover, in what may be its most egregious discovery ploy, counsel characterized the photograph of Kent's prototype as "Attorney-Work product," even though the photograph was taken by an ADS employee years before the present litigation ensued. When asked about the justification for listing the photograph on the privilege [*1289] log, ADS's counsel responded that the original photograph was photocopied by an attorney. This court, however, is unable [*45] to find any legal principle that even remotely supports the notion that an otherwise discoverable document alchemically metamorphosizes into privileged work product simply because an attorney photocopied it.

Thus, we conclude that the suppression of the Zhou deposition and the concealment of the photograph through a spurious privilege claim, coupled with the central role that such evidence would have played at this trial, amounts to bad faith conduct on the part of ADS's counsel. In a case such as this, in which counsel deliberately and repeatedly flouts discovery requests and disregards the Federal Rules of Civil Procedure, the sanction of a new trial fits the transgression. Indeed, the acts of ADS's counsel strike at the heart of the discovery process, and they deprived Kent of its full measure of a right to a fair trial based upon all the relevant evidence. Accordingly, we reverse the magistrate judge's denial of a motion for sanctions by granting a new trial. Furthermore, we strongly encourage

the magistrate judge to follow through on his desire to review very carefully the conduct of ADS's counsel and to consider, within his discretion, imposing disciplinary actions and additional [**46] sanctions beyond the granting of a new trial.

CONCLUSION

Based upon the discussion above, we vacate the judgment and remand for a new trial on the issue of anticipation because the magistrate judge's jury instruction

contained prejudicial legal error. We also remand for a new trial on the issues of obviousness and infringement because of the newly discovered evidence. In addition, we also reverse the magistrate judge's ruling on sanctions by the grant of a new trial.

REVERSED-IN PART, VACATED-IN-PART, AND
REMANDED.

COSTS

Costs to Kent.

LEXSEE 208 F.3d 1339

**HELIFIX LIMITED, Plaintiff-Appellant, v. BLOK-LOK, LTD. and WILLIAM SCOTT
BURNS, Defendants-Appellees, v. HELIFIX NORTH AMERICA CORPORATION,
Third Party Counterclaim Defendant.**

99-1196

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

208 F.3d 1339; 2000 U.S. App. LEXIS 6300; 54 U.S.P.Q.2D (BNA) 1299

April 7, 2000, Decided

PRIOR HISTORY:

[1]** Appealed from: United States District Court for the District of Massachusetts. Judge Robert E. Keeton.

DISPOSITION:

AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED.

COUNSEL:

Jack E. Dominik, Dominik, Knechtel, Demeur & Samlan, of Miami Lakes, Florida, argued for plaintiff-appellant.

H. Bissell Carey, III, Robinson & Cole LLP, of Boston, Massachusetts, argued for defendants-appellees.

JUDGES:

Before RADER, SCHALL, and GAJARSA, Circuit Judges.

OPINIONBY:

SCHALL

OPINION:

[*1341]

SCHALL, Circuit Judge.

Helifix Limited ("Helifix") appeals the order of the United States District Court for the District of Massachusetts denying its motion to preliminarily enjoin Blok-Lok, Ltd. and William Scott Burns n1 (collectively "Blok-Lok") from inducing infringement of, and contributorily infringing, United States Patent No. 5,687,801 ("the '801 patent"). See *Helifix Ltd. v. Blok-Lok, Ltd.*, No. 98-11093 (D. Mass. Dec. 15, 1998) (memorandum and order). Helifix also appeals the district court's interlocutory order granting summary judgment of patent invalidity in favor of Blok-Lok on Blok-Lok's counterclaim against Helifix. n2 The district court held that the '801 patent was invalid by reason of anticipation and the

[2]** on-sale bar under 35 U.S.C. § 102(b) (1994). See *Helifix Ltd. v. Blok-Lok, Ltd.*, 26 F. Supp. 2d 294, 52 U.S.P.Q.2D (BNA) 1486 (D. Mass. 1998). We affirm the denial of the motion for a preliminary injunction, vacate the grant of summary judgment of patent invalidity, and remand for further proceedings.

n1 William Scott Burns is the general manager of Blok-Lok, Ltd. and was named as a defendant in Helifix's complaint.

n2 Blok-Lok's Lanham Act counterclaim named as a third-party defendant Helifix North America Corporation, a wholly-owned subsidiary of Helifix.

BACKGROUND**I.**

The '801 patent, entitled "Method of Securing Walls with a Tie," issued from an application filed on September 27, 1996. That application was a divisional of Application Serial No. 08/491,358, filed June 30, 1995, which was a continuation-in-part of Application Serial No. 08/204,465, filed February 28, 1994. The patent names Robert Ian Paterson and Brian Alan Breeze as the inventors and Helifix as the assignee. **[**3]** The patent is directed to a method of securing layers of masonry **[*1342]** ("wythes"), such as an exterior brick wall and an interior concrete wall, by means of ties. See, e.g., '801 pat., claim 1. The typical tie is described as spiral-shaped, 7-8 inches long, and made of solid stainless-steel. See id. at col. 2, ll. 55-56, col. 4, l. 42. The sole claim of the patent recites:

1. A method of securing (1) two or more wythes in a building structure (2) utilizing a helical tie member (3) having longitudinal helical flutes terminating at a cutting end at one end and (4) terminating at a remote end oppo-

site the cutting end comprising the steps of:

(5) drilling a first wythe to a diameter less than than [sic] a diameter of the flutes on the tie to be inserted,

(6) drilling a pilot hole in a second wythe to a predetermined depth,

(7) inserting the remote end of the tie into a tool which (8) impactingly drives the tie and (9) rotatably permits the same to rotate as a helical bed is developed in the first wythe due to penetration by the tie,

(10) passing the flutes into the second wythe and continuing to impactingly drive the tie to a base of [**4] the pilot hole,

(11) removing the driving tool from the remote end of the tie, and thereafter (12) finishing the remote end of the tie in accordance with mandates of the site.

(The reference numerals are those added by the district court in its summary judgment order, see *Helifix*, 26 F. Supp. 2d at 297, 52 U.S.P.Q.2D (BNA) at 1489.) The patent teaches that pursuant to this method "the tie helically grasps the interior wythe ... as well as the exterior wythe ... , and a dry fix or tying [sic] relationship is developed." '801 pat., col. 5, ll. 34-36. The patent states that different tools can be used to drive the tie, "so long as the tie is permitted to rotate," id. at col. 4, l. 51, and that "it is important that the tie be free to rotate in the ... [tool] to avoid creating any stress in the masonry other than that imparted by the hammering action of the tie," id. at col. 5, ll. 47-52.

Figure 7 of the '801 patent shows a workman 21 practicing the invention of claim 1 by driving a helical tie member 10 into a building structure to secure a first wythe 2 to a second wythe 4:

[SEE FIGURE 7 IN ORIGINAL]

Figure [**5] 13 of the patent shows a helical tie member 10 securing wythes 2 and 4 in a building structure:

[SEE FIGURE 13 IN ORIGINAL] [*1343]

II.

In January of 1993, representatives of Helifix attended the World of Concrete trade show in Las Vegas, Nevada, where they displayed and distributed a brochure ("the '93 brochure"). The '93 brochure describes Helifix stainless steel ties and their use in masonry refacing and new construction. It also describes the use of the ties in both "DryFix" and "Dry-Chemical Fix" methods of construction. n3 With regard to the ties, the '93 brochure states:

The Helifix tie has a unique design which causes it to auger as it is installed. The tie cuts a helical groove as it

corkscrews into the wall ensuring that it bonds securely with most construction materials.

With regard to the DryFix method, which is at issue in this case, the '93 brochure states:

The DryFix technique is used to pin facing material to the backup where the cavity is minimal or non-existent. Ideal for pinning masonry facings or veneers to brick, block, or concrete. Ideal for use in multi-wythe composite walls.

The brochure explains the DryFix method [**6] with the following diagrams and descriptions:

1. Having determined the points of entry for the Helifix ties, a hole is drilled through the outer wythe into the backup substrate to a predetermined depth.

[SEE FIGURE 1 IN ORIGINAL]

2. The DryFix masonry tie is loaded into the insertion tool and power driven until the outer end of the tie is recessed below the face of the brickwork.

[SEE FIGURE 2 IN ORIGINAL]

[*1344]

3. The outer face is then finished with matching materials.

[SEE FIGURE 3 IN ORIGINAL]

The DryFix portion of the brochure also states that "... the special augering action of the tie avoids bricks or blocks splitting"

The last paragraph of the brochure is a "warranty" that provides as follows:

Seller makes no warranty of any kind, express or implied, except that the goods sold under this agreement shall be of the standard quality of seller, and buyer assumes all risk and liability resulting from the use of the goods, whether used singly or in combination with other goods. Seller neither assumes nor authorizes any person to assume for seller any other liability in connection with the sale or use of the goods sold, [**7] and there is no oral agreement or warranty collateral to or affecting this transaction.

The brochure also sets forth a telephone number and address to contact "for further information."

n3 In the DryFix method, the tie is secured to the wythes without chemicals. In the Dry-Chemical Fix method, a chemical resin secures the tie to the outer wythe.

III.

On June 4, 1998, Helifix filed suit against Blok-Lok, alleging that Blok-Lok was infringing and inducing infringement of the '801 patent, was infringing Helifix's

copyrighted catalogues, and was falsely designating the sponsorship of non-Helifix products as Helifix products. Helifix sought a preliminary injunction of the activities alleged to infringe the patent and demanded a jury trial. On July 9, 1998, Blok-Lok filed a counterclaim which included a request for a declaratory judgment of patent invalidity. Blok-Lok asserted that the '93 brochure describes the method claimed in the '801 patent and that the claimed method was on sale at the January 1993 [**8] World of Concrete trade show. Because the earliest United States priority date of the '801 patent, the February 28, 1994 filing date of Application Serial No. 08/204,465, was more than one year after the brochure was publicly distributed and more than one year after the trade show, Blok-Lok asserted that the method was unpatentable under 35 U.S.C. § 102(b).

In due course, Helifix moved for summary judgment of patent infringement and Blok-Lok cross-moved for summary judgment [*1345] of patent invalidity. The district court denied both motions on September 14, 1998. However, after a hearing on September 15, 1998, the court invited Blok-Lok to renew its motion. Blok-Lok did so, and on November 5, 1998, the court granted the renewed motion for summary judgment in an interlocutory order. See *Helifix*, 26 F. Supp. 2d at 303, 52 U.S.P.Q.2D (BNA) at 1494. In doing so, the court construed claim 1 of the '801 patent, focusing on the tool recited in the claim. See *id.* at 296-98, 52 U.S.P.Q.2D (BNA) at 1488-89. The court concluded that the claim is not limited to the specific tool described in the patent specification. See *id.* at 298, 52 U.S.P.Q.2D (BNA) at 1489. [**9] The court then determined that the '801 patent is anticipated by the '93 brochure under 35 U.S.C. § 102(b) and that activities at the World of Concrete trade show in January of 1993 amounted to an on-sale bar under 35 U.S.C. § 102(b). See *id.* at 298-303, 52 U.S.P.Q.2D (BNA) at 1490-93. The court therefore granted Blok-Lok's motion for summary judgment of patent invalidity on an interlocutory basis. n4 See *id.* at 303, 52 U.S.P.Q.2D (BNA) at 1494.

n4 The ruling was interlocutory because it did not dispose of all of the parties' claims. Specifically, there remained Helifix's copyright and false designation of origin claims and Blok-Lok's correction of inventorship, breach of contract, and Lanham Act claims.

On December 15, 1998, the district court denied Helifix's motion to preliminarily enjoin Blok-Lok from inducing infringement of, and contributorily infringing, the '801 patent. See *Helifix*, No. 98-11093, slip op. at 3. The court did so based upon [**10] its grant of summary judgment the previous month in favor of Blok-Lok:

It would not be consistent with the court's order of November 5, 1998 ... to grant plaintiff's motion for preliminary injunction that would prevent the defendants from infringing the '801 patent. That part of plaintiff's motion is denied.

Id.

Helifix appeals from the denial of its request for a preliminary injunction and the court's grant of Blok-Lok's motion for summary judgment.

DISCUSSION

I.

We have jurisdiction over the appeal of the denial of Helifix's request for a preliminary injunction pursuant to 28 U.S.C. § 1292(c)(1) (1994). We exercise our discretion to invoke pendent appellate jurisdiction over the interlocutory grant of summary judgment "because it is 'closely interrelated factually' to the preliminary injunction." *Gerber Garment Tech., Inc. v. Lectra Sys., Inc.*, 916 F.2d 683, 686, 16 U.S.P.Q.2D (BNA) 1436, 1439 (Fed. Cir. 1990) (quoting *Intermedics Infusaid, Inc. v. Regents of the Univ. of Minn.*, 804 F.2d 129, 134, 231 U.S.P.Q. (BNA) 653, 657 (Fed. Cir. 1986)); see also *Clinton v. Jones*, 520 U.S. 681, 707 n.41, 137 L. Ed. 2d 945, 117 S. Ct. 1636 (1997) [**11] (approving of the Court of Appeals' invocation of pendent appellate jurisdiction over Jones' cross-appeal because it was "inextricably intertwined" with Clinton's appeal and review of the cross-appeal was "necessary to ensure meaningful review" of the appeal (quoting *Swint v. Chambers County Comm'n*, 514 U.S. 35, 51, 131 L. Ed. 2d 60, 115 S. Ct. 1203 (1995))). As just seen, the district court based its denial of the preliminary injunction request on its summary judgment ruling in favor of Blok-Lok. See *Helifix*, No. 98-11093, slip op. at 3. Thus, the denial of the preliminary injunction and the grant of summary judgment are "inextricably intertwined."

II.

We turn first to the summary judgment of patent invalidity because it formed the basis for the district court's denial of Helifix's request for a preliminary injunction. We review a grant of summary judgment de novo, and affirm only if, when the facts are viewed in the light most favorable to the non-moving party and all doubts are resolved in favor of the non-movant, there are no genuine issues of [**1346] material fact and the moving party is entitled to judgment as a matter of law. See *Robotic Vision Sys., Inc. v. View Eng'g, Inc.*, 112 F.3d 1163, 1165, 42 U.S.P.Q.2D (BNA) 1619, 1621 (Fed. Cir. 1997). [**12] A patent is presumed to be valid, see 35 U.S.C. § 282 (1994), and this presumption only can be overcome by clear and con-

vincing evidence to the contrary. See, e.g., *WMS Gaming Inc. v. International Game Tech.*, 184 F.3d 1339, 1355, 51 U.S.P.Q.2D (BNA) 1385, 1396-97 (Fed. Cir. 1999). To be entitled to summary judgment, therefore, Blok-Lok had to establish that there were no material facts in dispute relating to its assertion of anticipation, and it had to present clear and convincing evidence that the '93 brochure anticipates the claim of the '801 patent. Alternatively, Blok-Lok had to establish that there were no material facts in dispute relating to its assertion of the on-sale bar, and it had to present clear and convincing evidence that the invention claimed in the '801 patent was on sale at the World of Concrete trade show.

A. Anticipation

An invention is anticipated under 35 U.S.C. § 102(b) if it "was ... described in a printed publication in this ... country ... more than one year prior to the date of application for patent in the United States." 35 U.S.C. § 102(b). The first step [**13] of an anticipation analysis is claim construction. See *Key Pharms. v. Hercon Labs. Corp.*, 161 F.3d 709, 714, 48 U.S.P.Q.2D (BNA) 1911, 1915 (Fed. Cir. 1998). Claim construction is a question of law that we review de novo. See *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456, 46 U.S.P.Q.2D (BNA) 1169, 1174 (Fed. Cir. 1998) (en banc). In construing patent claims, we look to the intrinsic evidence of record—the claims, the specification, and, if in evidence, the prosecution history. See *Vitronics Corp. v. Conceptiontronic, Inc.*, 90 F.3d 1576, 1582-83, 39 U.S.P.Q.2D (BNA) 1573, 1576-77 (Fed. Cir. 1996). If intrinsic evidence resolves all ambiguities, extrinsic evidence is not considered. See *id.*

1. The district court construed the claim of the '801 patent as not requiring the specific tool described in the patent specification, a hammer drilling machine fitted with an SDS chuck. See *Helifix*, 26 F. Supp. 2d at 298, 52 U.S.P.Q.2D (BNA) at 1489. We see no error in that construction. The claim of the '801 patent does not limit the method to a hammer drilling machine fitted with an SDS chuck, but recites a tool into which a tie can be inserted and that "impactingly [**14] drives the tie and rotatably permits the same to rotate" '801 pat., claim 1. The specification itself teaches that different tools can be used "so long as the tie is permitted to rotate." *Id.* at col. 4, ll. 46-51. The prosecution history reveals that the Patent Office determined that the method could be practiced without the specific tool described in the specification, and there is no indication that *Helifix* challenged that determination.

2. The second step in an anticipation analysis involves a comparison of the construed claim to the prior art. See *Key Pharms.*, 161 F.3d at 714, 48 U.S.P.Q.2D (BNA) at 1915. To be anticipating, a prior art reference

must disclose "each and every limitation of the claimed invention[,] ... must be enabling[,] and [must] describe ... [the] claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention." *In re Paulsen*, 30 F.3d 1475, 1478-79, 31 U.S.P.Q.2D (BNA) 1671, 1673 (Fed. Cir. 1994). If there is a genuine issue of material fact relevant to any one of these factors, summary judgment is not proper.

Helifix acknowledges that the '93 brochure was publicly [**15] distributed at the World of Concrete trade show more than one year before the earliest United States priority date for the '801 patent. It also acknowledges that the brochure teaches elements (1) - (7) and (11) and (12) of the '801 patent claim, as numbered by the district court. It argues, however, that the '93 brochure does not teach elements (8) - (10) of the claim. Specifically, it asserts that the brochure does not teach that the tool "impactingly drives the tie and [**1347] rotatably permits the same to rotate." '801 pat., claim 1.

The '93 brochure does not expressly disclose in words elements (8)-(10) of claim 1 of the '801 patent. The brochure might nevertheless be anticipating if a person of ordinary skill in the art would understand the brochure as disclosing elements (8)-(10) and if such a person could have combined the brochure's description of the invention with his own knowledge to make the claimed invention. See *In re Donohue*, 766 F.2d 531, 533, 226 U.S.P.Q. (BNA) 619, 621 (Fed. Cir. 1985).

The district court assumed that because a person of ordinary skill in the art is deemed to be aware of all relevant prior art, see *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962, 1 U.S.P.Q.2D (BNA) 1196, 1201 (Fed. Cir. 1986), [**16] such a person must be someone who is familiar with the pertinent literature and who is likely to attend trade shows. See *Helifix*, 26 F. Supp. 2d at 299, 52 U.S.P.Q.2D (BNA) at 1490-91. From that, the court reasoned that a person of ordinary skill in the art of the '801 patent would be a building reinforcement crew supervisor or a person in research and development. See *id.* The court determined that such a person would realize that putting a rotational force on the tie depicted in the '93 brochure would create a hole in the masonry of the same size as the tie, and, therefore, would prevent the tie from adhering to the masonry. See *id.* at 300, 52 U.S.P.Q.2D (BNA) at 1491. The court therefore concluded that the '93 brochure plainly conveyed to one of ordinary skill in the art, through the chevron symbol in figure 2 of the *DryFix* portion of the brochure, the absence of any symbol or words describing a rotational force, and statements in the brochure about the augering action of the tie, that an impacting force, and not a rotational force, is applied to the tie. See *id.* The court thus concluded that

the '93 brochure taught elements (8) - (10) of the patent claim. [**17] See id.

The district court should not have constructed the hypothetical person of ordinary skill in the art by determining which persons working in the field of the invention are likely to be familiar with the relevant literature. Instead, the court should have considered the educational level of the inventor; the type of problems encountered in the art; the prior art solutions to those problems; the rapidity with which innovations are made; the sophistication of the technology, and the educational level of workers in the field. See *Custom Accessories*, 807 F.2d at 962, 1 U.S.P.Q.2D (BNA) at 1201.

Moreover, neither Helifix nor Blok-Lok presented evidence on how a person of ordinary skill in the art would understand the '93 brochure. The only evidence of record relating to the meaning of the brochure is the testimony of Mr. Paterson, who is both an author of the brochure and an inventor of the claimed method. However, Mr. Paterson testified mainly as to what he intended to convey by the terms used in the brochure; he did not testify as to how a person of ordinary skill in the art would understand the brochure. In any event, Mr. Paterson's testimony is conflicting. On the [**18] one hand, he stated that he intended the chevrons in the figure of step two of the DryFix portion of the brochure to indicate "a hammering action." See Tr. of Sept. 15, 1998 Hr'g, at 120-21. He also stated, however, that the '93 brochure does not state that the tie is inserted into the wythe with an impacting action, and that "most people" assume that the tool shown in the brochure places a rotating force on the tie. See id. at 125-26. In short, on the record before us, there is a genuine issue of material fact as to whether the '93 brochure discloses elements (8) - (10) of the patent claim.

3. "Even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling." *Donohoe*, 766 F.2d at 533, 226 U.S.P.Q. (BNA) at 621. Helifix argues that the '93 brochure does not enable a tool capable of practicing the method recited in the patent and that such a tool was [*1348] not available at the time of the World of Concrete trade show. In making this argument, it points to the testimony of Mr. Paterson that Helifix had a difficult time developing a tool that would be useful at worksites, see Tr. of Sept. 15, 1998 Hr'g, [**19] at 26-27, and that the invention still was in development at the time of the trade show, see id. at 304-06. In addition, Helifix presented a July 29, 1994 document that, according to Helifix, demonstrates that Blok-Lok had returned 44 tools to Helifix because they were unsatisfactory.

We conclude, on the record before us, that Blok-Lok failed to provide clear and convincing evidence that the

'93 brochure enables a person of ordinary skill in the art to practice the claimed method. In particular, Blok-Lok did not present any evidence indicating that a person of ordinary skill in the art could have made or obtained a tool capable of being used in the claimed method without an undue amount of experimentation. See *In re Sheppard*, 52 C.C.P.A. 859, 339 F.2d 238, 242, 144 U.S.P.Q. (BNA) 42, 45 (CCPA 1981) (reversing a rejection under 35 U.S.C. § 102(b) where the asserted prior art reference did not permit someone skilled in the art to possess the claimed invention without an undue amount of experimentation).

Although the '93 brochure does not describe the tool used to perform the DryFix method, the district court determined that such a tool was enabled [**20] because the Patent Office had issued a restriction requirement between the claimed method and the specific tool described in the specification. See *Helifix*, 26 F. Supp. 2d at 300-301, 52 U.S.P.Q.2D (BNA) at 1491-92. The Patent Office can issue a restriction requirement if it finds that two or more inventions claimed in a patent application are "independent and distinct." 35 U.S.C. § 121 (1994). A process and apparatus (tool) for its practice can be restricted if either "the process as claimed can be practiced by another materially different apparatus or by hand" or "the apparatus as claimed can be used to practice another and materially different process." Man. Pat. Examining Proc. § 806.05(e) (7th ed. 1998). In response to a restriction requirement, an applicant must elect one invention for examination. See 37 C.F.R. § 1.142(a) (1999). Claims to the non-elected invention(s) are withdrawn from consideration and must be canceled before the application is allowed to issue as a patent. See 37 C.F.R. § 1.142(b) (1999).

The grandparent of the '801 patent, Application Serial No. 08/204,465, was filed with claim 1 to a method of securing wythes [**21] with a helical tie, claim 2 to a tool for driving a helical tie into a wall, and claims 3 and 4 to helical ties. The Patent Office issued a restriction requirement between the method, tool, and tie claims. With respect to the method and tool claims, the Patent Office asserted that the tool is not required to insert the tie. Helifix did not present any substantive arguments in response to this restriction requirement, and elected to pursue the method claim. In due course, the grandparent application was abandoned in favor of the parent application of the '801 patent, U.S. Application Serial No. 08/491,358. The parent application was filed with claim 1 to the method, claims 2 and 5-7 to the tool, and claims 3 and 4 to the helical tie. The Patent Office issued a restriction requirement along the same lines as the restriction requirement issued in the grandparent application, again asserting that the tool is not required to insert the tie. Helifix did not present any substantive arguments in response to this restriction re-

quirement, and elected to pursue the tool claims. The '801 patent application was filed with the same claims as the parent application; however, the tool claims were [**22] canceled in a preliminary amendment, and the tie claims were canceled pursuant to a telephone conference with the examiner. Accordingly, the patent issued with only method claim 1.

Blok-Lok argued before the district court that the Patent Office's repeated assertions that the tool claimed in the patent applications is not required to insert the tie demonstrate that the '93 brochure need [*1349] not describe the tool in order to enable the claimed method. The district court interpreted the restriction requirements as reflecting the Patent Office's determinations that other tools could be devised to practice the method of the '801 patent. See *Helifix*, 26 F. Supp. 2d at 300-01, 52 U.S.P.Q.2D (BNA) at 1491-92. Both Blok-Lok and the district court, however, have read too much into the restriction requirements in this case. The restriction requirements at issue merely reflect the Patent Office's conclusions that claim 1, by its terms, is not limited to a method using the tool recited in claim 2. Accordingly, the restriction requirements between the method claimed in the '801 patent and the specific tool described in the specification in no way bear on the enablement of a different tool. [**23] Because Blok-Lok did not present any other evidence indicating that the '93 brochure enables the claimed method, on the record before us there is not clear and convincing evidence that the '93 brochure anticipates the claim of the '801 patent.

B. The on-sale bar

Under 35 U.S.C. § 102(b), a patent is invalid by reason of the on-sale bar if "the invention was ... on sale in this country ... more than one year prior to the date of application for the patent in the United States." 35 U.S.C. § 102(b). In *Pfaff v. Wells Electronics, Inc.*, 525 U.S. 55, 119 S. Ct. 304, 142 L. Ed. 2d 261 (1998), the Supreme Court held that the on-sale bar applies when two conditions are met before the critical date, which in this case is February 28, 1994. First, "the product must be the subject of a commercial offer for sale." *Id.* at 67, 119 S. Ct. at 311. Second, "the invention must be ready for patenting." *Id.* at 67, 119 S. Ct. at 312. The Court explained that the second condition may be satisfied in at least two ways: "by proof of reduction to practice before the critical date; or by proof that prior [**24] to the critical date the inventor had prepared drawings or other descriptions of the invention that were sufficiently specific to enable a person skilled in the art to practice the invention." *Id.* at 67, 119 S. Ct. at 312 (footnote omitted).

At the time the district court ruled on Blok-Lok's motion for summary judgment, the Supreme Court had not

yet decided *Pfaff*. In concluding that the on-sale bar applied, the court started from the premise that the invention of the '801 patent was set forth in the '93 brochure. See *Helifix*, 26 F. Supp. 2d at 302, 52 U.S.P.Q.2D (BNA) at 1493. Turning to the on-sale issue, the court stated that the '93 brochure provided "very strong circumstantial evidence that the 'DryFix' method was being made available for sale" in January of 1993 at the World of Concrete trade show. *Id.*, 52 U.S.P.Q.2D (BNA) at 1492. The court further stated that nothing in the '93 brochure indicated that the methods, tools, and apparatus described in the brochure were unavailable for sale, and it noted that a statement on the back of the brochure that "Helifix ties have been subjected to extensive testing in a wide range of materials" was an indication [**25] that the product that was the subject of the brochure was ready for sale. *Id.*, 52 U.S.P.Q.2D (BNA) at 1492-93. The court also noted that there was a warranty on the back of the brochure. See *id.*, 52 U.S.P.Q.2D (BNA) at 1493. The court reasoned that, if the brochure "did not constitute an offer to sell or at least an indication that the products and methods described were available for sale, this warranty would be very odd indeed." *Id.* Finally, the district court took note of the "admission of the Helifix employees who were present at the World of Concrete trade show that they distributed and displayed" the brochure. *Id.* Under all of these circumstances, the court concluded that Blok-Lok had made out a prima facie case that the method embodied in claim 1 of the '801 patent was on-sale for purposes of section 102(b). See 26 F. Supp. 2d at 302-03, 52 U.S.P.Q.2D (BNA) at 1493-94.

If, in this case, there is a genuine issue of material fact relating to either of the two *Pfaff* conditions (first, the product or method of the invention being on-sale, and second, the invention being ready for [**1350] patenting), summary judgment was not proper. We conclude that summary judgment [**26] was improper because there is a genuine issue of material fact as to whether the method claimed in the '801 patent was ready for patenting at the time of the January 1993 World of Concrete trade show.

As discussed above, there are genuine issues of material fact as to whether the '93 brochure discloses and enables each element of the method claimed in the '801 patent. Accordingly, for purposes of summary judgment, the '93 brochure cannot be relied upon as an enabling description of the invention. Moreover, in the district court, Blok-Lok failed to allege that any other item provided a description of the invention that was "sufficiently specific to enable a person skilled in the art to practice the invention." Blok-Lok's ability to prevail on the issue of whether the invention of the '801 patent was ready for patenting at the time of the trade show thus depends on

its being able to establish that there are no genuine issues of material fact as to whether, at the time of the show, the method of claim 1 had been reduced to practice. This question turns on whether a tool capable of practicing the method had been developed in January of 1993. See *Robotic Vision*, 112 F.3d at 1165, 42 U.S.P.Q.2D (BNA) at 1624 [**27] (determining that a method that required a software program could not have been on-sale before a suitable software program had been developed even though the claims did not recite the software program).

We note first that reduction to practice of the claimed method does not require reduction to practice of the specific tool described in the '801 patent, but merely requires the development of any tool that meets the limitations recited in the claim. Thus, to establish that the method had been reduced to practice at the time of the World of Concrete trade show, Blok-Lok had to prove that Helifix had a tool into which a tie could be inserted and that would "impactingly drive the tie and rotatably permit the same to rotate as a helical bed is developed in the first wythe due to penetration by the tie." '801 pat., claim 1. On appeal, Blok-Lok points to the deposition testimony of Mr. Sweeney to the effect that a DryFix tool was available and on sale prior to the trade show. However, Mr. Sweeney did not testify about the characteristics of the DryFix tool in question. Accordingly, this testimony does not demonstrate that the tool could meet the limitations recited in the '801 patent claim. [**28] Blok-Lok also cites letters that mention DryFix tools, but these letters similarly fail to indicate the characteristics and capabilities of the tools. Mr. Paterson testified in a deposition that there were many tools that had been called "DryFix tools" and that those tools may not have borne any resemblance to the final tool described in the patent. Thus, there is a genuine issue of material fact as to whether a tool meeting the claim limitations had been developed at the time of the trade show, and, therefore, whether the invention had been reduced to practice so that it could have been "on sale" at that time.

Because we conclude, on the record before us, that there are genuine issues of material fact with respect to the issues of anticipation and the on-sale bar, we vacate the grant of summary judgment of patent invalidity. In doing so, we do not imply that the record supports a determination that the '801 patent is valid, or that summary judgment of patent invalidity on a more fully developed record would be improper. We merely hold, that, on the record before the district court, Blok-Lok did not establish its entitlement to summary judgment.

III.

We turn next to the denial [**29] of the preliminary injunction. To obtain the extraordinary relief of a prelim-

inary injunction, the moving party must establish that: (1) it has a reasonable likelihood of succeeding on the merits; (2) it will suffer irreparable harm if the injunction is not granted; (3) the balance of hardships tips in its favor; and (4) an injunction would be [*1351] consistent with the public interest. See, e.g., *Nutrition 21 v. United States*, 930 F.2d 867, 869, 18 U.S.P.Q.2D (BNA) 1347, 1348-49 (Fed. Cir. 1991). To overturn the denial of a preliminary injunction, the patentee "must show not only that one or more of the factors relied on by the district court was clearly erroneous, but also that a denial of the preliminary relief sought would amount to an abuse of discretion upon reversal of an erroneous finding." *New England Braiding Co. v. A.W. Chesterton Co.*, 970 F.2d 878, 882, 23 U.S.P.Q.2D (BNA) 1622, 1625 (Fed. Cir. 1992). Helifix has not met this burden.

A patent holder seeking a preliminary injunction bears the burden of establishing a likelihood of success on the merits with respect to the patent's validity. See *Nutrition 21*, 930 F.2d at 869, 18 U.S.P.Q.2D (BNA) at 1349. [**30] The presumption of the patent's validity created by 35 U.S.C. § 282 (1994 & Supp. III 1997) "does not relieve a patentee who moves for a preliminary injunction from carrying the normal burden of demonstrating that it will likely succeed on all disputed liability issues at trial, even when the issue concerns the patent's validity." *New England Braiding*, 970 F.2d at 882, 23 U.S.P.Q.2D (BNA) at 1625. If the alleged infringer raises a substantial question concerning validity, i.e., asserts an invalidity defense that the patentee cannot prove "lacks substantial merit," the preliminary injunction should not issue. *Genentech, Inc. v. Novo Nordisk*, 108 F.3d 1361, 1364, 42 U.S.P.Q.2D (BNA) 1001, 1003 (Fed. Cir. 1997).

The district court denied Helifix's preliminary injunction motion because it would have been inconsistent with its summary judgment of patent invalidity. See Helifix, No. 98-11093, slip op. at 3. Having determined that the '801 patent was invalid, the district court presumably concluded that Helifix would not be able to establish a likelihood of success on the merits. The district court did not consider the issues of irreparable harm, [**31] the balance of hardships, or whether an injunction would be consistent with the public interest.

As discussed above, we conclude that the district court erred in granting Blok-Lok's motion for summary judgment. At the same time, we cannot say that, based upon the record before it, the district court abused its discretion in denying Helifix's request for a preliminary injunction. Because an alleged infringer must establish by clear and convincing evidence that a patent is invalid, Helifix has been able to show on appeal that genuine issues of material fact bar entry of summary judgment in favor of Blok-

Lok. However, Helifix has not been able to establish that Blok-Lok's validity defense "lacks substantial merit."

Blok-Lok argues that the '801 patent is invalid by reason of anticipation and the on-sale bar. As noted above, Helifix acknowledges that the '93 brochure teaches elements (1) - (7) and (11) and (12) of claim 1 of the '801 patent. As far as elements (8) - (10) are concerned, the drawing of the brochure with a chevron and the equivocal testimony of Mr. Paterson make it a very open question as to whether those elements are or are not disclosed in the brochure. If they are, [**32] then claim 1 is anticipated by the brochure.

Turning to the on-sale bar question, we have vacated the district court's grant of summary judgment in favor of Blok-Lok because we have concluded that there are genuine issues of material fact relating to the second Pfaff condition: whether the invention of the '801 patent was ready for patenting at the time it allegedly was on sale. We have come to that conclusion based largely upon the conflicting testimony of Mr. Sweeny, on behalf of Blok-Lok, and Mr. Paterson, on behalf of Helifix. In our analysis of the on-sale bar issue, we did not discuss the first Pfaff condition: whether the product at issue was the subject of a commercial offer for sale. We point out at this juncture, however, that the evidence on this point can fairly be said to be very much in equipoise. On the one hand, Mr. Paterson admitted that Helifix attended the World of Concrete trade [**1352] show for "commercial purposes," Tr. of Sept. 15, 1998 Hr'g, at 130, and that the '93 brochure was distributed at the trade show to interest potential customers in purchasing the described products for use in the described methods. On the other hand, Mr.

Paterson testified that the [**33] DryFix method was included in the brochure only "as a teaser," id. at 128, that the method "primarily promoted [at the trade show] was the dry chemical fix method," id. at 130, and that no price list was distributed at the trade show.

In sum, although the record before us does not support the district court's grant of summary judgment, it does raise a substantial question of patent invalidity. For that reason, we see no clear error in the finding of the district court that, in the face of Blok-Lok's challenge to the validity of the '801 patent, Helifix could not establish a likelihood of success on the merits. Under these circumstances, it was not necessary for the court to consider the remaining preliminary injunction factors. See *Reebok Int'l Ltd. v. J. Baker Inc.*, 32 F.3d 1552, 1556, 31 U.S.P.Q.2D (BNA) 1781, 1784 (Fed. Cir. 1994) ("[A] district court may properly deny a motion for preliminary injunction simply based on the movant's failure to establish a reasonable likelihood of success on the merits."). We therefore find no abuse of discretion in the district court's denial of Helifix's request for a preliminary injunction.

CONCLUSION

We affirm the denial [**34] of Helifix's request for a preliminary injunction, vacate the interlocutory summary judgment of patent invalidity, and remand the case for further proceedings consistent with this opinion.

AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED

COSTS

Each party shall bear its own costs.

LEXSEE 17 USPQ2d 1461

Ex parte Stanley B. Levy

Appeal No. 90-1864 from Art Unit 158.

Application filed December 21, 1988, Serial No. 287,234, which is a Division of Serial No. 914,108, filed October 1, 1986, now RE 32,983 granted July 4, 1989; and a Reissue of Serial No. 510,812, filed July 5, 1983, now Patent No. 4,490,421, granted December 25, 1984.

Balloon and Manufacture Thereof.

Board of Patent Appeals and Interferences

1990 Pat. App. LEXIS 18; 17 U.S.P.Q.2D (BNA) 1461

July 18, 1990, Heard

October 16, 1990, Decided

[*1]

Before Steiner, Tarring and J. Smith, Examiners-in-Chief.

COUNSEL:

Louis H. Rombach et al. for appellant.

Primary Examiner - James Seidleck.
Louis H. Rombach et al.
E. I. DuPont De Nemours and Co.
Legal Department
Patent Division
Wilmington, Delaware 19898

OPINIONBY:

STEINER

OPINION:

Steiner, Examiner-in-Chief.

This is an appeal from the final rejection of claims 13 through 17 and 25, which are all of the claims remaining in this application for reissue of U.S. Patent No. 4,490,421.

The subject matter on appeal is directed to a polymeric balloon exhibiting properties which enable its use as a catheter balloon for medical dilation procedures, such as coronary angioplasty wherein a catheter with a balloon at a distal end thereof is inserted into coronary arteries and inflated. The balloon must be capable of exerting sufficient pressure to dilate stenotic lesions without rupture of the balloon.

Claims 13 and 25, the only independent claims on appeal, read as follows:

13. High molecular weight, biaxially oriented, flexible polymeric balloon having a wall tensile strength of at least 31,714 psi (218.86 MPa).

25. High molecular weight, biaxially oriented, flexible polyethylene terephthalate dilatation [*2] catheter balloon.

The references relied upon by the examiner are:

Wyeth et al. (Wyeth)	3,733,309 May 15, 1973
Schjeldahl et al. (Schjeldahl '989)	4,413,989 Nov. 8, 1983 n1
Schjeldahl et al. (Schjeldahl '000)	4,456,000 June 26, 1984 n2

n1 Each of the Schjeldahl references contains essentially the same relevant disclosure. Accordingly, unless otherwise indicated, we have referred to these references collectively as "Schjeldahl," consistent with the approach adopted by both appellant and the examiner.

n2 See footnote 1.

Claims 13, 14, 16, 17 and 25 stand rejected under 35 U.S.C. 102 as anticipated by Schjeldahl. Claims 13 through 17 stand rejected under 35 U.S.C. 103 based upon "Schjeldahl et al in view of Wyeth as set forth in the Final Rejection" (paragraph bridging pages 3 and 4 of the Answer). We reverse each rejection.

The Rejection of Claims 13, 14, 16, 17 and 25 Under 35 U.S.C. 102.

The factual determination of anticipation requires the disclosure in a single reference of every element of the claimed invention. *In re Spada*, F.2d , 15 USPQ2d 1655 (Fed. Cir. 1990); *In re Bond*, F.2d , 15 USPQ2d 1566 (Fed. Cir. 1990); *Diversitech Corp. [*3] v. Century Steps, Inc.*, 850 F.2d 675, 7 USPQ2d 1315 (Fed. Cir. 1988); *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); *Alco Standard Corp. v. TVA*, 808 F.2d 1490, 1 USPQ2d 1337 (Fed. Cir. 1986); *In re Marshall*, 578 F.2d 301, 198 USPQ 344 (CCPA 1978); *In re Arkley*, 455 F.2d 586, 172 USPQ 524 (CCPA 1972). Moreover, it is incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference. *Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

Each of the independent claims on appeal defines a polymeric balloon which is "biaxially oriented." Ergo, in order to establish a prima facie basis to defeat the patentability of independent claims 13 and 25 under 35 U.S.C. 102, the examiner is obliged to point out where Schjeldahl discloses a biaxially oriented polymeric balloon. The tenor of the final rejection and Answer presupposes that Schjeldahl discloses a biaxially oriented polymeric balloon. See, for example, page 5 of the Final Rejection wherein the examiner states

the reference clearly teaches [*4] a biaxially oriented balloon catheter, and states that it is made by injection blow molding.

See, also, page 5 of the Answer wherein the examiner states

arguments that the references don't disclose a biaxially oriented PET (polyethylene terephthalate) balloon catheter is contrary to what is clearly stated in the references (emphasis supplied).

The examiner does not point to, and we do not find, any express disclosure in Schjeldahl of a biaxially oriented polymeric balloon.

It would appear that the relevant evulgations in Schjeldahl which may have led the examiner to his determination are:

(A) an expander n3 formed from a thin, flexible inelastic, high tensile strength, biaxially oriented synthetic plastic material (column 2 of Schjeldahl '989, lines 63 through 65, emphasis supplied);

n3 Schjeldahl characterizes the catheter balloon as an expander.

(b) The expander 30 is preferably formed from a suitable synthetic plastic material, such as biaxially oriented polypropylene, by an injection blow molding operation and, as such, is substantially inelastic in both the axial and radial directions and may, for example, have a finished wall thickness in [*5] the range of from 0.005 to 0.200 millimeters, 0.025 millimeters being typical (column 6 of Schjeldahl '989, lines 45 through 52, emphasis supplied);

(c) It has been found that an expander of the above-dimensional characteristics can withstand internal inflation pressure in excess of 7 atmospheres without fear of rupture (column 6 of Schjeldahl '989, lines 62 through 65);

(d) injection blow molding step used to form the expander 30 (column 8, lines 16 and 17);

(e) the expander 30 is formed from a biaxially oriented thin plastic material capable of withstanding relatively high internal pressures without rupture and without exceeding the elastic limit for the material itself (column 10 of Schjeldahl '989, lines 32 through 36, emphasis supplied);

(f) the expander 82 is preferably formed from a suitable synthetic plastic material such as biaxially oriented polypropylene or biaxially oriented polyethylene terephthalate by an injection molding operation and, as such, is substantially inelastic in both the axial and radial direction (column 12 of Schjeldahl '989, lines 22 through 37, emphasis supplied); and

(g) Apparatus as in claim 1 wherein said nonelastic expander [*6] member comprises a longitudinally extending thin, flexible, tubular element formed from a biaxially oriented synthetic plastic material surrounding said outer tubular member with opposed ends thereof secured to said outer tubular member at spaced apart locations proximate said distal end thereof (claim 8 of Schjeldahl '989, emphasis supplied).

These excerpts do not justify the determination that Schjeldahl discloses a biaxially oriented polymeric balloon.

According to Schjeldahl, the starting material is a biaxially oriented synthetic plastic material, such as polyethylene terephthalate. The final article, i.e., the expander or catheter balloon, is not characterized as

biaxially oriented. Moreover, it would appear to be undisputed that the only method disclosed by Schjeldahl for transforming the biaxially oriented starting plastic into the final catheter balloon, i.e., injection blow molding, is not capable of producing a biaxially oriented catheter balloon. In fact, it is undisputed that injection blow molding would destroy the biaxial orientation of the plastic starting material. We refer to the Belcher affidavits, Exhibits [*7] V, VI and VIII, n4 which factually set forth the differences between "injection blow molding" and "injection stretch blow molding," and support the conclusion that the "injection blow molding" process disclosed by Schjeldahl could not possibly produce a biaxially oriented polymeric balloon. n5

n4 Unless otherwise indicated, all exhibits mentioned are the exhibits to appellant's Brief.

n5 We recognize that a high burden of proof is required to demonstrate the inoperability of a United States patent. *In re Weber*, 405 F.2d 1403, 160 USPQ 549 (CCPA 1969); *In re Michalek*, 162 F.2d 229, 74 USPQ 107 (CCPA 1947). However, as noted above, Schjeldahl does not disclose a catheter balloon made of a biaxially oriented plastic. Therefore, appellant's evidence is not an attack on the operability of Schjeldahl, but quite relevant to the issue of inherency, i.e., whether the catheter balloon disclosed by Schjeldahl is inherently biaxially oriented.

Indeed, the examiner agrees with appellant's position that injection blow molding could not produce a biaxially oriented balloon. See, for example, page 5 of the Final Rejection wherein the examiner states:

statements that [*8] injection blow molding without stretching will not produce a biaxially oriented article are true . . . (emphasis supplied).

The examiner goes on, in the same sentence, to state:

but since the reference produces a biaxially oriented article, clearly a stretching step must be used.

Again, on page 5 of the Answer, the examiner states:

Since Schjeldahl et al produces a biaxially oriented article it follows that a stretching step must be used in the injection blow molding process.

The inescapable facts are that Schjeldahl does not disclose a biaxially oriented catheter balloon and does not mention a stretching step.

The examiner also relies upon the theory that Schjeldahl's catheter balloon is inherently biaxially oriented. On page 4 of the Answer, the examiner points out that inasmuch as the Patent and Trademark Office does not have the requisite laboratory equipment for testing, the burden shifts to appellant. However, the initial burden of establishing a prima facie basis to deny patentability to a claimed invention rests upon the examiner. *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). In relying upon the theory of inherency, the examiner [*9] must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. *In re King*, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*,

721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983); *In re Oelrich*, 666 F.2d 578, 212 USPQ 323 (CCPA 1981); *In re Wilding*, 535 F.2d 631, 190 USPQ 59 (CCPA 1976); *Hansgirk v. Kemmer*, 102 F.2d 212, 40 USPQ 665 (CCPA 1939). In our opinion, the examiner has not discharged that initial burden.

Schjeldahl does not provide any working example revealing the process conditions employed to produce the catheter balloon. We have only a general invitation to employ "injection blow molding." As previously discussed, it is undisputed that injection blow molding would not have produced a biaxially oriented balloon and would have destroyed the biaxial orientation of a polymeric starting material.

Schjeldahl does not disclose any particular tensile strength of the catheter balloon. We do not find sufficient factual basis or cogent scientific reasoning to support the [*10] conclusion that Schjeldahl's disclosure with respect to the ability of the catheter balloon to "withstand an internal inflation pressure in excess of 7 atmospheres without fear of rupture" (column 6 of Schjeldahl '989, lines 63 through 65) necessarily means that the catheter balloon is biaxially oriented. According to the membrane equation calculations reported in Levy's declaration (Exhibit IV), Schjeldahl's balloon could not possibly exhibit the tensile characteristics of a biaxially oriented balloon. Levy's calculations are inconsistent with those of Pinchuk (Exhibit III). Suffice it to say, the conflicting calculations taint the factual determination of inherency with impermissible conjecture. Indeed, the examiner, in the paragraph bridging pages 4 and 5 of the Answer, states that

the membrane equation used to determine the tensil [sic], [tensile] strength can be manipulated to produce any desired value, and thus is misleading. Nevertheless, the examiner goes on to favor Pinchuk's calculations by stating in that same paragraph that

certainly use of the typically used wall thickness disclosed in Schjeldahl et al with the average radius, as done in the Pinchuk Declaration [*11] would be reasonable.

As noted above, the conflicting results obtained by applying the membrane equation, and the examiner's acknowledgment that that equation "can be manipulated to produce any desired value," underscore the speculative nature upon which the determination of inherency rests.

We do not find sufficient cogent technical reasoning and/or objective evidence to support the conclusion that Schjeldahl's characterization of the catheter balloon as inelastic in the axial and radial direction necessarily means that the catheter balloon is biaxially oriented. The characteristic "inelastic," as employed by Schjeldahl, apparently means that the catheter balloon will expand to a preformed diameter to enable precise measurement of the pressures exerted on the inner wall of the artery during the dilation procedure (column 4 of Schjeldahl '989, lines 12 through 17).

In summary, Schjeldahl does not disclose a biaxially oriented catheter balloon. We do not find a sufficient basis to support the determination that Schjeldahl's balloon is inherently (necessarily) biaxially oriented. *In re King*, supra; *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, supra; [*12] *In re Oelrich*, supra; *In re Wilding*, supra; *Hansgirk v. Kemmer*, supra. Accordingly,

the examiner's rejection of claims 13, 14, 16, 17 and 25, under 35 U.S.C. 102 as anticipated by Schjeldahl is reversed. n6

n6 There is evidence of record that Dupont, the assignee of the application, furnished biaxially oriented polyethylene terephthalate to Schjeldahl when he informed Dupont personnel that he required a thin, high strength polymeric film having a tensile strength in the range of 20,000 - 40,000 psi. See the Schjeldahl affidavit (Exhibit VIII) and the Dengler declaration executed on May 21, 1988 and appended to the protest submitted in parent application Serial No. 914,108. Such facts are not inconsistent with our determination that Schjeldahl does not disclose a biaxially oriented polyethylene terephthalate catheter balloon. The Rydell affidavit appended to the protest in the parent application does not persuade us that Schjeldahl expressly or inherently discloses a biaxially oriented polymeric catheter balloon. See Belcher's affidavit (Exhibit VI).

The Rejection of Claims 13 through 17 under 35 U.S.C. 103 Based upon the Combined Disclosures of Schjeldahl [*13] and Wyeth.

Wyeth is directed to producing high strength biaxially oriented polyethylene terephthalate beverage containers. The disclosed method involves stretching polyethylene terephthalate having a relatively high inherent viscosity; e.g., at least about 0.85.

It is apparent from the Final Rejection and Answer that the examiner's rejection of the appealed claims under 35 U.S.C. 103 is not predicated upon the theory that one having ordinary skill in the art would have been led to employ Wyeth's technique to produce a biaxially oriented balloon for use in Schjeldahl's catheter. Instead, the examiner presupposes that Schjeldahl discloses a biaxially oriented catheter balloon. The examiner relies upon Wyeth solely for the disclosed use of high viscosity polyethylene terephthalate tubing. We refer to page 6 of the Answer, first complete paragraph, wherein the examiner explains the rejection by stating:

Wyeth et al is not being combined with Schjeldahl et al, but merely shows the claimed high viscosity PET (polyethylene terephthalate) and supports the examiners [sic], [examiner's] inherency arguments. n7

. . . The examiner is not substituting the process of Wyeth [*14] et al into Schjeldahl et al since both disclose the same process. n8 Arguments that Wyeth et al can't be scaled down are irrelevant since the examiner is not seeking to scale down that reference to produce the claimed article.

n7 Actually, according to the Final Rejection which is incorporated in the Answer,

it is the Examiner's position that it would be prima facie obvious to use the high viscosity polyethylene terephthalate of Wyeth in Schjeldahl et al to produce the claimed product (page 4, the only complete paragraph).

n8 It is apparent from our reversal of the examiner's rejection under 35 U.S.C. 102 that, in our opinion, Schjeldahl discloses neither a biaxially oriented catheter balloon nor a molding process which involves stretching.

We have already concluded that the examiner factually erred in determining that Schjeldahl expressly or inherently discloses a biaxially oriented catheter balloon. Assuming, arguendo, the examiner correctly concluded that one having ordinary skill in the art would have been led to employ a high viscosity polyethylene terephthalate tubing in producing Schjeldahl's catheter balloon, the rejection under 35 U.S.C. 103 must fall [*15] because the examiner has not established that the resulting catheter balloon is biaxially oriented. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

Inasmuch as the examiner's rejection under 35 U.S.C. 103 is not predicated upon the theory that one having ordinary skill in the art would have been led to employ a conventional stretch blow molding technique, such as that disclosed by Wyeth, to produce Schjeldahl's catheter balloon, the motivation for such a combination is an issue which was not crystallized on appeal and was not confronted by appellant. However, in view of the examiner's gratuitous statement in the paragraph bridging pages 5 and 6 of the Answer, n9 we are constrained to address that issue.

n9 The noted statement provides:

Certainly in the least there was an invitation to make a biaxially oriented catheter balloon at the time of the Schjeldahl et al invention. Additionally injection stretch blow molding to produce biaxially oriented articles was well known at the time of the Schjeldahl et al invention (emphasis supplied).

There appears to be no dispute that one having ordinary skill in the art would have recognized [*16] the desirability of producing a biaxially oriented balloon for use in Schjeldahl's catheter, since biaxially oriented materials were known to exhibit high tensile strengths. The thrust of the evidence relied upon by the examiner is that one having ordinary skill in the art would have simply resorted to a conventional stretch molding technique to produce a biaxially oriented balloon for use in Schjeldahl's catheter, specifically, the technique employed by Wyeth to produce a beverage container. See paragraph 4 of the Rydell affidavit executed April 25, 1988 and offered in support of the protest in parent application Serial No. 914,108, paragraph 5 of the Pinchuk affidavit (Exhibit III), and paragraphs 4 and 5 of the Kaufman affidavit (Exhibit XII). Interestingly enough, Wyeth disagrees. See page 5 of Wyeth's declaration (Exhibit XI). Wyeth points out various differences between the PET bottles produced by his disclosed process and the requirements of a catheter balloon, and then concludes that his process could not be used to produce a catheter balloon of the type disclosed by Levy.

We are persuaded by Belcher's affidavits and Wyeth's declaration, notwithstanding the [*17] affidavits of Rydell, Pinchuk and Kaufman, n10 that the known processes for producing biaxially oriented beverage containers, such as that disclosed by Wyeth, could not have been simply scaled down to produce a biaxially oriented catheter balloon for use in medical dilation procedures without the exercise of inventive skill. n11 Based upon the record before us, it would appear unrealistic to conclude that one having ordinary skill in the art would have been led to employ Wyeth's technique, which is designed to produce beverage containers, to produce Schjeldahl's catheter balloon, motivated by a reasonable expectation of obtaining a biaxially oriented polymeric catheter balloon. *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988). The rejection under 35 U.S.C. 103 is also reversed.

n10 We agree with appellant that the credentials of Belcher and Wyeth in the relevant art appear more impressive than those of protestor's experts. According to the affidavit appearing as Appendix V, Belcher authored the chapter called "Blow Molding of Polymers" for the fifth edition of the Plastic Engineering Handbook of the Society of Plastics Industry. In addition, Belcher authored two chapters, one on "injection blow molding" and one on "stretch blow molding" for the Blow Molding Handbook of the Society of Plastics and Engineers. We consider Wyeth's opinion with respect to the capabilities of his own invention entitled to greater weight than the opinions of Rydell, Pinchuk and Kaufman.

n11 We find it somewhat unrealistic in light of the apparent disparities in size and function, Belcher's affidavits and Wyeth's declaration, that Pinchuk and Kaufman equate beverage bottles to catheter balloons. See paragraph 10 of the Pinchuk affidavit (Exhibit III), wherein it is stated

as a blow molded polymeric article, a bottle and a catheter balloon are equivalent.

See, also, paragraph 4 of the Kaufman affidavit (Exhibit XII), wherein it is stated that

anyone with ordinary skill in the plastics art would know how to make a biaxially oriented PET balloon; it would be similar to making a biaxially oriented PET bottle because both catheter balloons and bottles are equivalent structures -- they are both fluid containers. [*18]

REVERSED

LEXSEE 339 f.2d 238

IN RE WILLIAM A. SHEPPARD

No. 7259

United States Court of Customs and Patent Appeals

52 C.C.P.A. 859; 339 F.2d 238; 1964 CCPA LEXIS 263; 144 U.S.P.Q. (BNA) 42

Oral argument November 6, 1964

December 17, 1964

PRIOR HISTORY:

[***1]

APPEAL from Patent Office, Serial No. 799,468

DISPOSITION:

Reversed.

COUNSEL:

Gary A. Samuels (*C. Harold Herr, Frederick Schafer*, of counsel) for appellant.Clarence W. Moore (*Raymond E. Martin*, of counsel) for the Commissioner of Patents.

OPINION BY:

WORLEY

OPINION:

[**238]

[*859] Before WORLEY, Chief Judge, and RICH, MARTIN, SMITH, and ALMOND, JR., Associate Judges

WORLEY, Chief Judge, delivered the opinion of the court:

This appeal is from the decision of the Board of Appeals which affirmed the examiner's rejection of product claims 2 and 3 in appellant's [*860] application n1 for "Arylsulfur Pentafluorides and their Preparation." Two process claims were allowed.

n1 Serial No. 799,468, filed March 16, 1959.

The nature of the subject matter involved is reflected in the appealed claims:

2. Compounds of the formula

$$X(n)R(SF(5))(m),$$

wherein R is an aromatic hydrocarbon group, X has

a maximum of eighteen carbons and is a member of the group consisting of halogen, hydroxyl, thiol, hydrocarbyl, halohydrocarbyl, oxahydrocarbyl, thiahydrocarbyl, hydrocarbonyl, hydrocarbonyloxy, carboxy and groups hydrolyzable thereto, and sulfo and groups hydrolyzable thereto, [***2] m is a whole number of 1-3, inclusive, and n is a cardinal number of from zero to 5, inclusive. [**239]

3. Phenylsulfur pentafluoride.

Appellant states in his specification that "the compounds of the invention are characterized by excellent thermal and chemical stability" and "**** the sulfur pentafluoride group is resistant to hydrolysis under acidic, basic and natural conditions." The compounds are said to be useful as fluids for high temperature power transmissions, hydraulic systems or liquid-coupled mechanical drives, and as solvents for highly fluorinated polymer compositions useful in waterproofing cellulose materials.

The reference relied on is:

Emeleus et al. J. Chem. Soc. (London), Vol. of 1946, pp. 1126-1131.

That article relates to preparation of alkyl- and aryl-substituted fluorides of sulfur, selenium and tellurium, with the following portions particularly pertinent:

The fluorides of sulfur, selenium, and tellurium show decided differences from the other halides of these elements. For instance, in all three cases the maximum covalency of 6 is reached in combination with fluorine, but not with the other halogens, even at low temperatures. The hexafluorides [***3] are exceptionally stable, whereas the other halides, including the fluorides, easily hydrolyse and dissociate when heated. Indeed, some doubt exists as to the formation of lower fluorides of selenium and tellurium. Considerable interest, therefore, attaches to the preparation and properties of the alkyl- and aryl-substituted fluorides of these elements. Experiments are described below which seem to show that substituted

hexafluorides such as RSF(5) are not stable * * *.

Experimental

Fluorination of the Substituted Dihalides. - No fluorine derivatives in this were isolated. Attempts were made to replace chlorine by fluorine in PhSCl, o-NO(2)[*] C(6)H(4)[*] SCl, o-NO(2)[*] C(6)H(4)[*] SBr, and p-NO(2)[*] C(6)H(4)[*] SCl, with silver, mercurous, mercuric, and hydrogen fluoride. All these substances reacted with [*861] the metallic fluorides, but the product always consisted mostly of the corresponding disulphide, mixed with tarry matter containing some fluorine * * *.

Higher Substituted Fluorides. - No analogues of the compounds SRF(3), SRF(5) and SeRF(5) exist for the halogens. It was therefore necessary to choose methods of preparation [***4] other than by way of the usual metal fluorides or hydrogen fluoride. Experiments were made on the following lines: (1) The action of Grignard reagents upon sulphur tetra- and hexa-fluoride. (2) The action of fluorine, or phenyliodonium fluoride, upon the organic disulphides and diselenides.

(1) Gaseous sulphur hexafluoride bubbled through an ethereal solution of phenylmagnesium bromide did not react below the b.p. of ether. Liquid "sulphur tetrafluoride" *** reacted violently with phenylmagnesium bromide in ether at -60 degrees. The products, however, contained no volatile fluorine compound and apparently consisted of PhSBr and bromine * * *.

(2) The reaction at 0 degree between fluorine-nitrogen mixtures and chloroform solutions of diphenyl diselenide or o- or p-nitrophenyl disulphide yielded only hydrogen fluoride and tarry or high-boiling condensation products. ***

Discussion

From the work described, the following conclusions emerge: (1) The substituted fluorides of sulphur, selenium, and tellurium are much less stable than the other halides. Stability increases from fluorine to iodine. (2) Stability increases in all the halides with the number of organic [***5] radicals in the [**240] molecule, and most noticeably in the fluorides. (3) Stability increases from sulphur to tellurium.

*** The results of the attempts to fluorinate the

phenyl sulphur halides can be explained as follows: The phenyl sulphur fluoride first formed disproportionated to a mixture of the disulphide and a higher fluoride [e.g., p-NO(2)[*] C(6)H(4)[*] SF to (p-NO(2)[*] C(6)H(4)[*] S)(2) and p-NO(2)[*] C(6)H(4)[*] SF(3) or p-NO(2)[*] C(6)H(4)[*] SF(5)]; the latter then decomposed by intermolecular condensations to hydrogen fluoride and tarry products. ***

The examiner rejected claims 2 and 3 over Emeleus, stating that the claimed compounds differ from the reference compound, p-NO(2)[*] C(6)H(4)[*] SF(5), in that they contain either no substituent on the phenyl group (as in phenylsulfur pentafluoride), or some substituent other than a nitro group (as in the Markush grouping set forth in claim 2). He regarded the claimed compounds as "unpatentable analogs" of the nitro compound of Emeleus, since the "nitro group is as close to some of the members of the Markush group as they are to each other." Presumably the statutory basis for [***6] the examiner's rejection is 35 U.S.C. 103.

After observing that halogen is a member of the Markush group set forth by appellant, the board affirmed the examiner's rejection of claim 2 n2 on Emeleus. It noted "the analogy between a nitro group and [*862] a chloro group as a substituent has long been recognized," citing *In re Taub*, 29 CCPA 893, 125 F.2d 719, 52 USPQ 480. In response to appellant's argument that his compounds are stable, whereas the reference compounds are described as being unstable, the board stated:

n2 The board initially affirmed the rejection of claim 3 under 35 U.S.C. 103 as well; however, on petition for reconsideration, that ground of rejection was withdrawn.

*** In view of the great variety of compounds that are described by appellant as being very stable it seems highly unlikely that only the nitro variant would be unstable even if it were pure. If in fact there is a difference in stability it can with reason only be attributed to differences in the mode of preparation resulting either in differing kinds and/or degrees of impurity * * *.

On the basis of its own study of Emeleus, the board also regarded the reference to anticipate claim [***7] 3, hence claim 2, under 35 U.S.C. 102(a), reasoning:

*** the p-nitro phenylsulfur pentafluoride compound mentioned *** is merely exemplary of results obtained by the experiments described *** in the paragraph entitled "Fluorination of the Substituted Dihalides." *** [That paragraph] does not mention any sulfur pentafluorides but states that attempted fluorination of phenylsulfur chloride and p-nitrophenyl sulfur chloride with metallic fluorides yielded corresponding disulfides and a tarry mat-

ter and hydrogen fluoride. *** [The "Discussion" portion of Emeleus] has a more detailed explanation in some respects and states that it is a "higher fluoride" which decomposes to yield the hydrogen fluoride and tarry products and that this higher fluoride could be a phenyl sulfur pentafluoride. Appellant has not denied that such a pentafluoride is obtained, and, this being the case, we must assume that the experiments yielded phenyl sulfur pentafluoride as well as the p-nitro compound. The reference clearly teaches one skilled in the art the possible existence of phenyl sulfur pentafluoride just as well as it teaches that of the nitro compound.

*** We have made [***8] it clear that the compound of claim 3 is explicitly taught by Emeleus et al. and we, accordingly, hold that claims 2 and 3 are unpatentable over the reference for this reason also. Their [**241] allowance would be contrary to 35 U.S.C. 102(a) ***.

With that background information, we must determine the correctness of the rejections of claims 2 and 3 under 102(a) and claim 2 under 103. From our evaluation of the record we are inclined to conclude that the board erred in both instances.

Rejection under 35 U.S.C. 102(a)

We begin by agreeing with the board that Emeleus "teaches one skilled in the art the possible existence of phenyl sulfur pentafluoride just as well as it teaches that of the nitro compound." Emeleus says "all these substances," referring to PhSCl and p-NO(2)[*] C(6)H(4)[*] SCl, reacted with the designated fluorinating agents. It seems to us that a person of ordinary skill in the art could fairly expect those compounds [*863] to follow a similar hypothetical reaction path. Thus, under "Discussion" Emeleus states:

*** The results of the attempts to fluorinate the phenyl sulfur halides can be explained as follows: The phenyl sulfur fluoride [***9] first formed disproportionated to a mixture of the disulphide and a higher fluoride [e.g., p-NO(2)[*] C(6)H(4)[*] SF to (p-NO(2)[*] C(6)H(4)[*] S)(2) and p-NO(2)[*] C(6)H(4)[*] SF(3) or p-NO(2)[*] C(6)H(4)[*] SF(5)]; the latter then decomposed ***.

If we regard Emeleus as suggesting that the corresponding unsubstituted compound, C(6)H(5)SCl (PhSCl), undergoes a similar reaction, the disclosure in effect says:

*** [C(6)H(5)[*] SF to C(6)H(5)[*] S(2) and C(6)H(5)[*] SF(3) or C(6)H(5)[*] SF(5)]; the latter then decomposed ***. [All emphasis supplied.]

However, we reach an opposite conclusion than the

board that phenyl sulfur pentafluoride disclosed in that manner is an enabling disclosure of the claimed invention within our understanding of 35 U.S.C. 102(a). We agree with appellant that the board erred in concluding that either p-NO(2)[*] C(6)H(4)[*] SF(5) or C(6)H(5)[*] SF(5) is "explicitly taught" by Emeleus. We find that teaching to be less than unequivocal noting that he states that p-NO(2)[*] C(6)H(4)[*] SF(3) or p-NO(2)[*] C(6)H(4)[*] SF(5) is believed to be formed. Indeed, the board's language in its initial opinion [***10] indicates its uncertainty on that point as well as on the part of Emeleus. The board stated:

*** [Emeleus] states that it is a "higher fluoride" which decomposes *** and that this higher fluoride could be a phenyl sulfur pentafluoride. *** The reference clearly teaches one skilled in the art the possible existence of phenyl sulfur pentafluoride ***. [Emphasis supplied.]

In its decision on reconsideration, the board said:

Such words as "could" and "possible" were used by us merely because the authors of the reference were not certain that the named compounds were actually obtained * *. We are not aware of any decision which requires that the author of a reference must be certain that a compound is obtained for that reference to be a valid one.

The uncertainty which pervades that teaching of the reference leads us to conclude that Emeleus cannot properly be held an enabling disclosure.

A further reason why the board erred in concluding C(6)H(5)[*] SF(5) is "explicitly taught," is that the Emeleus disclosure is not sufficient to place the public in possession of the invention. Emeleus has expressly stated that at least p-NO(2)[*] C(6)H(4)[*] SF(3) [***11] or p-NO(2)[*] C(6)H(4)[*] SF(5), both postulated transient intermediates, decompose to form tarry products. In the "Experimental" portion of the reference, Emeleus asserts an inability to isolate any fluorine derivatives which might have resulted from the reaction of the substituted dihalides with the designated [*864] fluorinating agents. Further on, under "Higher-substituted Fluorides," Emeleus indicates a complete lack of success in preparation of pentafluorides by (1) the reaction of Grignard reagents upon sulfur hexafluoride [**242] (2) the action of fluorine upon organic disulphides. n3 It is clear to us from our study of Emeleus that it was beyond the author's skill as a chemist to alter the reaction conditions or reactants in order to make a stable pentafluoride. No other evidence appears in the record before us which shows that a person of ordinary skill in the art, upon reading Emeleus, would be able to combine the teachings of that article with his own knowledge of this art to obtain possession of appellant's

stable arylsulfur pentafluorides.

n3 We note in passing that appellant's process for preparing arylsulfur pentafluorides involves reaction of an aryldisulfide or aryl sulfur trifluoride with silver difluoride at temperatures of 115 degrees to 150 degrees C.

***12]

Most of the cases cited by the solicitor in support of the Patent Office position that Emeleus discloses the claimed invention within the meaning of 35 U.S.C. 102(a) were considered by us in *In re LeGrice*, 49 CCPA 1124, 1142-4, 301 F.2d 929, 942-3, 113 USPQ 365, 376-7. As noted there, explicit or implicit in all those cases is the concept of a certain degree of knowledge possessed by one skilled in the arts involved, to the end that such knowledge, taken with the disclosure of the printed publications, was sufficient to place the disclosed invention in the possession of the public. We think *In re Doyle*, 51 CCPA 993, 327 F.2d 513, 140 USPQ 421, and *In re Fried*, 51 CCPA 1118, 329 F.2d 323, 141 USPQ 27, cited by the solicitor in addition to those considered in *LeGrice*, are of the same nature and are not controlling. Cf. *In re Brown*, 51 CCPA 1254, 329 F.2d 1006, 141 USPQ 245; *E. I. du Pont de Nemours & Co. v. Ladd*, 328 F.2d 547, 140 USPQ 297. We have no such explicit or implicit knowledge shown in the record here. [1] The Emeleus article is not so particular and definite that, without undue experimentation, one versed in the art to which it pertains could gain possession of the ***13] claimed subject matter. Under the circumstances we feel obliged to reverse the rejection of claims 2 and 3 under 35 U.S.C. 102(a).

Rejection under 35 U.S.C. 103

In finding the compounds of claim 2, particularly the chloro derivative, unpatentable over the p-nitro phenyl sulfur pentafluoride "disclosed" by Emeleus, the board relied on, erroneously, we think, *In re Taub* as authority for reaching the conclusion that the two substituents are analogous.

In *Taub*, this court sustained the conclusion of the examiner that nitro and chloro substituents "are considered to be equivalents in a [*865] molecule of the size claimed, in the absence of a showing or unexpected properties in the chloro product." [Emphasis supplied.] The compounds in *Taub* were quaternary ammonium salts in which four hydrocarbon groups, one a chloro-benzyl radical, were attached to the nitrogen atom. The prior art disclosed the same compound except a nitro-benzyl group was attached to the nitrogen atom. Both compounds were useful as fungicides, and it was not shown the compounds differed in effectiveness.

Here, however, Emeleus states that the postulated nitro derivative is unstable and decomposes. ***14] Appellant, on the other hand, discloses that arylsulfur pentafluorides having specific substituents are stable chemically and thermally. The prior art neither suggested that arylsulfur pentafluorides would be stable, nor was it aware of that desirable property. Indeed, Emeleus would lead one skilled in the art to the opposite conclusion when it states "Experiments *** seem to show that substituted hexafluorides such as RSF(5) are not stable."

The board speculated that the instability of Emeleus' compounds can only be due to impurities. As appellant points out, Emeleus does not give that reason as the source of instability. The whole tenor of Emeleus leads one of ordinary skill in the art to believe instability is due to the nature of the compounds rather than outside factors. It appears to us that only by hindsight could the board conclude "it seems highly unlikely that only the nitro variant would be unstable."

[2] Based on our evaluation of the record and understanding of the chemistry involved, we are inclined to agree with appellant that the board erred in its interpretation of, and rejection on, the Emeleus reference. Should there be doubt on that score we feel ***15] obliged to resolve it in favor of appellant.

The decision is reversed.

LEXSEE 429 F.2d 447

IN RE GENE R. WILDER

No. 8194

United States Court of Customs and Patent Appeals

57 C.C.P.A. 1314; 429 F.2d 447; 1970 CCPA LEXIS 304; 166 U.S.P.Q. (BNA) 545

Oral argument April 9, 1970

August 13, 1970

PRIOR HISTORY:

[***1]

Appeal from Patent Office, Serial No. 355,473

DISPOSITION:

Modified.

COUNSEL:

Ellsworth H. Mosher, attorney of record, for appellant.
Stevens, Davis, Miller & Mosher, of counsel.*Joseph Schimmel* for the Commissioner of Patents.
Fred W. Sherling, of counsel.

OPINIONBY:

BALDWIN

OPINION:

[**448]

[*1315] Before RICH, BALDWIN, LANE, Associate Judges, and JONES, Judge, sitting by designation

BALDWIN, Judge, delivered the opinion of the court:

Wilder has appealed from the decision of the Patent Office Board of Appeals which sustained the rejection of claims 2, 6, 7, 9, 11, 12 and 14 in his application n1 as unpatentable under 35 USC 102 and 35 USC 103 over a patent to Stahly. n2 In his brief, appellant has moved to dismiss the appeal as to claims 11, 12 and 14. That motion is hereby granted, thus leaving claims 2, 6, 7 and 9 for our consideration.

n1 Serial No. 355, 473, filed Mar. 27, 1964, for "Preserving Rubber."

n2 U.S. Patent 3,163,616, granted Dec. 29, 1964, on an application filed Aug. 31, 1956.

The Invention

We note, as did the board, that "the nature of the asserted invention is evident from the reproduced claims." Claims 2 and 7 are representative [***2] [*1316] of the claims now on appeal. We reproduce them, at the suggestion of appellant, in analytical form:

2. Preserved rubber having minimal toxicity to human skin comprising

[1] natural rubber having incorporated therein

[2] an amount sufficient to inhibit degradation of

[a] N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine,

the rubber containing said adjuvant being neither a primary irritant nor a sensitizing agent.

7. Preserved rubber having minimal toxicity to human skin comprising

[1] synthetic sulfur-vulcanizable diene hydrocarbon rubber having incorporated therein

[2] an amount sufficient to inhibit degradation of

[a] N-(1,4-dimethylamyl)-N'-phenyl-p-phenylenediamine,

the rubber containing said adjuvant being neither a primary irritant nor a sensitizing agent.

Claim 6 defines the rubber using the same broad language as claim 7, and recites the same 1,3-dimethylbutyl inhibitor of claim 2. Claim 9 differs from claim 2 only in that the rubber claimed is "unvulcanized styrene-butadiene copolymer". [**449]

For a further understanding of the invention, we quote from appellant's specification:

It has been long recognized that [***3] N-alkyl-N'-phenyl-p-phenylenediamines inhibit the aging of natural rubber. More recently, it was found that N-isopropyl-

N'-phenyl-p-phenylenediamine inhibits exposure cracking of synthetic rubber vulcanizates and this compound has come into considerable commercial use for this purpose. However, it is a skin sensitizer and volatile enough to cause numerous cases of skin eruption among workers processing the rubber. Moreover, it is much too soluble in the aqueous coagulation medium used for SBR to be considered for protecting unvulcanized SBR.

Appellant's claims are based on the discovery that rubber containing either of the two specific antidegradants claimed does not have the toxic effect alleged to be possessed by the other N-alkyl-N'-phenyl-p-phenylenediamines.

The Rejections

The examiner rejected the claims on appeal "as unpatentable over Stahly under 35 USC 102." That patent contains what amounts to a generic disclosure, broadly teaching that the entire class of N-alkyl-N'-phenyl-p-phenylenediamines (to which class, appellant's specific adjuvants belong) is effective for preserving all kinds of rubber against the deteriorative action of ozone. Broadly stating first [***4] that the alkyl substitute may be primary, secondary, or tertiary, branched or straight chain and may be substituted with aryl or cycloalkyl groups, the patent disclosure goes on to recite that excellent stabilizing properties are possessed by those phenylenediamines in which the alkyl [*1317] group contains from 1 to 19 carbon atoms and further that members of the class in which alkyl group contains from 1 to 9 carbons "are especially effective."

Becoming more particular, later on, the patent sets out two separate groups of specific phenylenediamines "containing alkyl groups in the preferred range of number of carbon atoms." The first group contains 8 compounds, the alkyl group containing from 3 to 9 carbon atoms and showing most of the stated configurations (e.g. secondary, tertiary, aryl-substituted). The second group recites 16 more alkyl substitutes wherein the number of carbon atoms ranges from 1 to 19 and varying configurations are also indicated. Of this latter group, the express recitations of the 1,3-dimethylbutyl and 1-methylhexyl radicals are of particular interest as they are the specific disclosures upon which the appealed rejections are based.

The method of [***5] incorporating the phenylenediamines into the rubber is taught by Stahly and specific mention of several types of rubbers, all being sulfur-vulcanizable diene hydrocarbon rubbers and including both those specifically recited in the instant claims, is made. Examples describing the preservative effect on various rubbers of several of the N,N'-substituted p-phenylenediamines from both of the groups of specific

compounds mentioned earlier are also given.

Stahly's patent contains no express disclosure of the exact compositions defined in the claims now on appeal nor does it contain any hint that his compositions would possess any skin irritating or sensitizing property. Regardless of these facts, the examiner took the position that the claims now before us were anticipated by Stahly's disclosure. While he conceded that the compound recited in claim 7 on appeal was not exactly recited in the patent, he felt that the recited compound and Stahly's 1-methyl hexy variant "may be the same." When appellant submitted affidavits substantiating the asserted advantage of the claimed compositions, the examiner responded:

It is respectfully submitted that even with the affidavit and assuming [***6] that the showings of non-toxicity are completely valid for the compositions so limited by the instant claims, there [***450] can be no patentable invention where novelty does not exist, albeit all of the properties of said compositions were not previously recognized.

[The] Examiner has not ignored the limitation relative to toxicity, as urged by appellant. However, said limitation has to be considered meaningless when it only goes to describe a property of a composition recited by the instant claims which composition, itself, is shown by the prior art to be lacking in novelty since it is fully anticipated and recited.

The Board of Appeals sustained the rejection, upholding the examiner on all grounds with regard to claims 2, 6 and 9. As to claim 7, the board stated:

[*1318] [The] compound of Stahly relied upon by the Examiner is a position isomer of the compound defined by the claims. However, no showing as to difference in toxicity of these two compounds when incorporated in rubber has been made, and their chemical similarity is apparent. If the compound of Claims 7 and 12 is not fully anticipated under 35 U.S.C. 102, it is obvious under 35 U.S.C. 103. [***7] The rejection of claims 7 and 12 will also be sustained.

Opinion

Considering first the rejection of claims 2, 6 and 9 under 35 USC 102, we have concluded that the rejection is sustainable. Appellant's arguments attacking the position taken by the Patent Office in this rejection appear to be made on three different levels. It is argued initially that the disclosure of the Stahly patent does not anticipate the claimed compositions. Secondly, it is asserted that even though there may be a technical anticipation, the discovery of the new property and the recitation of

57 C.C.P.A. 1314, *1318; 429 F.2d 447, **450;
1970 CCPA LEXIS 304, ***7; 166 U.S.P.Q. (BNA) 545

this property in the claims "lends patentable novelty" to the claims. Finally the court is urged to ignore the "fortuitous suggestions" of the prior art, overrule the "doctrine" of *In re Thuau*, 30 CCPA 979, 135 F.2d 344, 57 USPQ 324 (1943), and recognize the commercial importance of appellant's discovery.

[1] Employing, if we may, a syllogistic analysis to answer appellant's arguments, we start with the proposition that claims cannot be obtained to that which is not new. This was the basis of the holding in *In re Thuau*. It was the law then, is now and will be until Congress decrees otherwise. So the first inquiry [***8] must be into exactly what the claims define. Towards that goal, we state the next proposition, which is that every [2] limitation positively recited in a claim must be given effect in order to determine what subject matter that claim defines. [3] However, recitation, in a claim to a composition, of a particular property said to be possessed by the recited composition, be that property newly-discovered or not, does not necessarily change the scope of the subject matter otherwise defined by that claim. No matter how we read appellant's claims, they define nothing other than rubber compositions containing particular rubbers combined with particular antidegradant compounds.

[4] Once having ascertained exactly what subject matter is being claimed, the next inquiry must be into whether such subject matter is novel. If an applicant had to prove novelty before he could obtain a patent he would have an almost insurmountable burden. Therefore, the statute provides for what may be said to be a presumption of novelty in the language of section 102 "a person shall be entitled to a patent unless -" (Emphasis added). What this means, in an ex parte proceeding to obtain a patent, is [***9] that the Patent Office has the initial burden of coming forward with some sort of evidence tending [1319] to disprove novelty. In this case, the examiner came forward with evidence, i.e., the Stahly patent, tending to show that the subject matter of appellant's claims "was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant." [***451] 35 USC 102(e). Our province now becomes an evaluation of the legal sufficiency of that showing, taking into account appellant's attacks against it, and weighing in any evidence which he might have submitted tending to show the contrary.

[5] Simply stated, a prior publication or patent description will be considered as anticipatory when its disclosure is at once specific and enabling with regard to the particular subject matter at issue. In effect, a prima facie case is made out whenever a reference is shown to contain a disclosure which is specific as to every critical element of the appealed claims. However, such disclosure may

yet be held not to legally anticipate the claimed subject matter if it is found not to be sufficiently enabling, in other [***10] words, if it does not place the subject matter of the claims within "the possession of the public." See, e.g., *In re LeGrice*, 49 CCPA 1124, 301 F.2d 929, 133 USPQ 365 (1962); *In re Brown*, 51 CCPA 1254, 329 F.2d 1006, 141 USPQ 245 (1964).

Those parts of the reference patent relied on below as making out a specific disclosure of the claimed compositions have been summarized earlier. In arguing against a finding of specific disclosure, appellant emphasizes the fact that there is no express disclosure showing the particular rubber compositions here claimed. He also points out the large number of variations possible with Stahly's disclosure and the fact that "Stahly's singles out the N-isopropyl-N'-phenyl-p-phenylenediamine as unique." On the other hand, we have noted that the particular adjuvant of these claims is one of 24 expressly disclosed as preferred by Stahly. In addition, the reference teaching is broadly enabling with regard to the manner of making and using both the specific adjuvant and the rubber compositions containing it. Furthermore, the patentee mentions no more than about a half dozen rubbers, all of which are "sulfur-vulcanizable diene hydrocarbon" rubbers, as possible [***11] components of the resistant compositions, with particular emphasis being placed on the same two rubbers specifically recited in claims 2 and 9 on appeal. Taking all these factors into account, we are constrained to hold that the Stahly patent does contain what amounts to a specific description of at least those rubber compositions containing either natural rubber or styrenebutadiene copolymer rubber with each and every one of the 24 adjuvants expressly mentioned. The compositions of claims 2, 6 and 9 are thus specifically described by the reference.

[1320] [6] Appellant has also submitted evidence, by way of affidavit, showing that the rubber compositions of his claims possess a property unexpectedly superior in a secondary but important characteristic, the hoped-for inference apparently being that if the claimed composition was, in fact, known by the reference patentee, it would have been listed as preferred above all other possibilities, because of this property. If this evidence is submitted in an attempt merely to prove the absence of a physical, tangible existence of the claimed compositions in the prior art it is inapposite, since such proof would not necessarily [***12] negate the fact that the reference does, in fact, describe those very compositions. The statute requires nothing more.

[7] Nor does such evidence require the inference that the compound apparently disclosed by Stahly and the adjuvant recited in the rejected claims are necessarily dif-

57 C.C.P.A. 1314, *1320; 429 F.2d 447, **451;
1970 CCPA LEXIS 304, ***12; 166 U.S.P.Q. (BNA) 545

ferent. In the past we have accepted such an inference and found no anticipation where it has been proved that a compound apparently specifically described in a reference disclosure could not possibly have been made by the process taught by the reference, *In re Jacobs*, 50 CCPA 1316, 318 F.2d 743, 137 USPQ 888 (1963), or where the compounds claimed had properties completely different from those attributed to them by the reference description, *In re Kalm*, 54 CCPA 1466, 378 F.2d 959, 154 USPQ 10 (1967). The evidence submitted here, however, quite reasonably also permits the inference that the reference patentee might only have been unaware of a particular property [*452] of the compound he did disclose. Such proof clearly falls short of defeating a case of anticipation.

With regard to the rejection of claim 7 under 35 USC 103, appellant asserts that he has met his burden of demonstrating unobviousness [***13] by showing the unexpected non-toxicity of his composition and argues that he should not have to conduct experiments to determine the toxicity of rubber containing the isomer mentioned by Stahly. He also points out that he has demonstrated in his affidavits that the six-carbon, 1,3-dimethylbutyl compound of claims 2, 6 and 9 has unexpectedly different properties from its isomers and argues that this fact alone should be enough to support an inference that the properties of the seven-carbon, 1,4-dimethylamyl adjuvant of claim 7 would be similarly different from those of its isomers.

[8] Appellants' first assertion is unacceptable. As we pointed out recently in *In re Hoch*, No. 8323, decided July 30, 1970, the mere fact that an applicant has discovered an unexpected property in a compound which is structurally similar to that disclosed in the prior art is not enough, in and of itself, to make his claimed subject matter unobvious. The law is clear in requiring a

showing of unexpected differences [*1321] between the properties of the compound recited in the instant claimed composition and those possessed by the prior art. n3

n3 It will be apparent that we are treating the instant claims, concededly drawn to compositions, as if the only important element is the antioxidant adjuvant and the rubber merely acts as a matrix or environment wherein the important properties of the adjuvant compound are manifested. In this respect the claims may be said to be similar to those drawn to pharmaceutical or insecticidal compositions similarly containing only a single "active" ingredient. It should also be apparent that this approach cannot be utilized with all claims drawn to compositions.

[***14]

However, we can see no reason why such differences and their unexpected nature may not be demonstrated by other than a direct comparison. The problem is simply one of evidence and it should be a simple matter to accord various types of proofs their appropriate weight. In the present case, appellant's indirect, circumstantial evidence has satisfied us that the composition of claim 7, more likely than not, does possess properties different from those possessed by a composition containing the seven-carbon isomer disclosed by the reference and that such differences would have been unexpected to one having ordinary skill in the art. We hold, therefore, that he has overcome the prima facie showing made by the Patent Office and that the rejection of claim 7 under 35 USC 103 should be reversed.

Summary

The decision of the Board of Appeals is affirmed as to claims 2, 6 and 9 and reversed as to claim 7.

LEXSEE 766 F.2d 531

IN RE JOHN A. DONOHUE

No. 85-868

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

766 F.2d 531; 1985 U.S. App. LEXIS 15739; 226 U.S.P.Q. (BNA) 619

July 3, 1985

PRIOR HISTORY:

[**1]

Appealed from: U.S. Patent & Trademark Office Board of Appeals.

DISPOSITION:

Affirmed.

COUNSEL:

William Magidson, of Chicago, Illinois, argued, for Appellant.

Harris A. Pitlick, Associate Solicitor, U.S. Patent & Trademark Office, of Arlington, Virginia, argued for Appellee. With him on the brief were Joseph F. Nakamura, Solicitor and John W. Dewhirst, Associate Solicitor.

JUDGES:

Markey, Chief Judge, Baldwin, Circuit Judge, and Miller, * Senior Circuit Judge.

* Judge Miller assumed senior status effective June 6, 1985.

OPINIONBY:

MILLER

OPINION:

[**531] Miller, Senior Circuit Judge.

This is an appeal from the decision of the U.S. Patent and Trademark Office ("PTO") Board of Appeals ("board") sustaining the [**532] final rejection of appellant's claims n1 1, 2, 5, 6, 7, 25, and 28. We affirm.

n1 In application Serial No. 263,900, filed May 15, 1981, for Tetramethylbiphenylcarboxylic Acids and Derivatives Thereof, which is a division of Serial No. 60,909, filed July 26, 1979, and a continuation of Serial No. 622,649, filed October 15,

1975, which is a continuation-in-part of Serial No. 517,506, filed October 24, 1974.

[**2]

BACKGROUND

The subject matter of this appeal was previously before this court's predecessor in *In re Donohue*, 632 F.2d 123, 207 U.S.P.Q. (BNA) 196 (CCPA 1980) (*Donohue I*). n2 There is no need to discuss the details of that opinion; however, a summary of the pertinent facts is appropriate for a full understanding of the issues before us.

n2 *Donohue I* involved application No. 622,649. See note 1, *supra*.

The present invention relates to 2,2',6,6'-tetramethylbiphenyl-4,4'-dicarboxylic acid compounds which are suitable for producing polymers used to form shaped objects, such as film, fibers, or molded parts. Claim 1, which is the sole independent claim on appeal, is illustrative:

2,2',6,6'-tetramethylbiphenyl-4,4'-dicarboxylic acid compound comprising said acid, an acyl halide derivative thereof, or a simple ester thereof.

The PTO has rejected all the appealed claims under 35 U.S.C. § 102(b) "as anticipated by Nomura [et al.], optionally in view of Lincoln and Walker [**3] [et al.]."

Nomura et al. ("*Nomura*") n3 discloses twelve 2,2',6,6'-tetramethylbiphenyls ("*TMBP*") which are 4,4'-disubstituted with NH[2], NMe[2], OH, OMe, Cl, Br, I, CO[2]H, CO[2]Me, CN, NO[2], or H substituents. Methods of preparing all these compounds, except those disubstituted with CO[2]H or CO[2]Me, are set forth in Nomura. Nomura's disclosure of how to make 4,4'-dinitrile (or dicyano) TMBP is particularly significant, because Lincoln n4 and Wagner et al. ("*Wagner*") n5 teach, generally, the preparation of carboxylic acids from nitriles by hydrolysis.

n3 Yujiro Nomura and Yoshito Takeuchi, "Substituent Effects in Aromatic Proton Nuclear Magnetic Resonance Spectra. Part VI. [^2H] Benzene-induced Solvent Shifts in 4,4'-Disubstituted 2,2',6,6'-Tetramethylbiphenyls and Related Compounds," *J. Chem. Soc'y (B)*, 956-60 (1970).

n4 U.S. Patent No. 3,876,691, issued April 8, 1975, on application No. 351,696, filed April 16, 1973, for a "Process for the Hydrolysis of Nitriles."

n5 Wagner et al., *Synthetic Organic Chemistry* 412-15 (John Wiley & Sons, N.Y., N.Y.) (1965).

[**4]

In *Donohue I*, a majority of the Court of Customs and Patent Appeals ("CCPA") affirmed the PTO's rejection of appealed claims 1, 5, 6, and 7 n6 under 35 U.S.C. § 102(b). *Id.* at 127, 207 U.S.P.Q. at 200. The basis for the rejection was, as it is here, Nomura with reference to Lincoln and Wagner. *Id.* at 126, 207 U.S.P.Q. at 199.

n6 Claim 1 in *Donohue I* differs from claim 1 of the present appeal only in that the latter includes the limitation "comprising said acid, an acyl halide derivative thereof, or a simple ester thereof." Claims 5, 6, and 7 of *Donohue I* specify the same dependent features as in the presently-appealed claims of the same number.

A minority of the CCPA voted to reverse the PTO's decision, because they concluded it was uncertain from the text of Nomura that the dicarboxylic acid TMBP and dimethyl ester TMBP were ever prepared. *Id.* at 129, 207 U.S.P.Q. at 201. Accordingly, Nomura's disclosure was, in the minority's view, no more than a mere naming of the claimed compounds [**5] which is insufficient to constitute an enabling disclosure. *Id.* at 129, 207 U.S.P.Q. at 201.

After *Donohue I*, the presently-appealed application was filed. During prosecution before the PTO, appellant submitted an affidavit under 37 C.F.R. § 1.132 executed by Dr. Ellis K. Fields ("Fields affidavit"). In this affidavit, Dr. Fields states that he wrote to Dr. Yoshito Takeuchi, one of the authors of Nomura, to ask whether the disclosed dicarboxylic acid TMBP or dimethyl ester TMBP compounds were ever synthesized, as indicated in Nomura. Dr. Takeuchi responded by stating that these compounds were not synthesized, and Dr. [**533] Fields submitted his affidavit to that effect.

Despite the Fields affidavit, the examiner finally rejected the claims, and an appeal to the board was filed. The board affirmed the rejection of the claims on the grounds

stated *supra*, holding that it was bound by *Donohue I*. As to the Fields affidavit, the board held that whether the authors of Nomura actually prepared the claimed compounds is not "material or relevant"; rather, the key factor in evaluating the adequacy of a reference's disclosure was deemed to be whether that disclosure [**6] would have been enabling, and the board determined that the CCPA had decided that question with respect to Nomura.

ANALYSIS

Appellant has made a record different from that in *Donohue I* by submitting the Fields affidavit. This new record presents a new issue of patentability with respect to whether the previously-sustained anticipation rejection can still be maintained. In view of this new issue, the PTO properly declined to make a formal *res judicata* rejection and addressed the question of whether the Fields affidavit overcomes the rejection of the claims based on Nomura. See *In re Ackermann*, 58 C.C.P.A. 1405, 444 F.2d 1172, 1176, 170 U.S.P.Q. (BNA) 340, 343 (1971); *In re Russell*, 58 C.C.P.A. 1081, 439 F.2d 1228, 1230, 169 U.S.P.Q. (BNA) 426, 428 (1971); *In re Herr*, 54 C.C.P.A. 1315, 377 F.2d 610, 611, 153 U.S.P.Q. (BNA) 548, 549 (1967).

Appellant argues that the Fields affidavit, which states that the authors of Nomura did not make the disclosed dicarboxylic acid TMBP and dimethyl ester TMBP compounds, overcomes the PTO's rejection. It is urged that *Donohue I* and *In re Samour*, 571 F.2d 559, 197 U.S.P.Q. (BNA) 1 (CCPA 1978), require, *inter alia* [**7], that a 35 U.S.C. § 102(b) rejection based on a primary reference disclosing a claimed compound in conjunction with one or more references which teach how to make that compound, should be sustained only if the claimed compound was actually made. We disagree.

It is well settled that prior art under 35 U.S.C. § 102 (b) must sufficiently describe the claimed invention to have placed the public in possession of it. n7 *In re Sasse*, 629 F.2d 675, 681, 207 U.S.P.Q. (BNA) 107, 111 (CCPA 1980); *In re Samour*, 571 F.2d at 562, 197 U.S.P.Q. at 4; see also *Reading & Bates Construction Co. v. Baker Energy Resources Corp.*, 748 F.2d 645, 651-52, 223 U.S.P.Q. (BNA) 1168, 1173 (Fed. Cir.1984). Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention. See *In re LeGrice*, 301 F.2d at 939, 133 U.S.P.Q. at 373-74. Accordingly, even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling. *In re Borst*, 52 C.C.P.A. 1398, 345 F.2d 851, 855, 145 U.S.P.Q. (BNA) 554, 557 (1965), cert. [**8] denied, 382 U.S. 973, 83 S. Ct. 537, 15 L. Ed. 2d 465 (1966). It is not, however, necessary that an invention disclosed in a publication shall

have actually been made in order to satisfy the enablement requirement.

n7 This rule is based on the "described in a printed publication" language in 35 U.S.C. § 102(b). See *In re LeGrice*, 49 C.C.P.A. 1124, 301 F.2d 929, 936, 133 U.S.P.Q. (BNA) 365, 371 (1962).

In re Wiggins, 488 F.2d 538, 179 U.S.P.Q. (BNA) 421 (CCPA 1973) and *In re Sheppard*, 52 C.C.P.A. 859, 339 F.2d 238, 144 U.S.P.Q. (BNA) 42 (1964), do not support a contrary view. In those cases, the references were deemed insufficient, because they stated that attempts to prepare the claimed compounds were unsuccessful. Such failures by those skilled in the art (having possession of the information disclosed by the publication) are strong evidence that the disclosure of the publication was nonenabling. By contrast, the fact that the author of a publication did not attempt to make his disclosed [*9] invention does not indicate one way or the other whether the publication would have been enabling.

Although *In re Samour* and *Donohue I* mention that the claimed invention in each case was apparently produced in conjunction with the anticipatory reference, this is a far cry from proclaiming that such production [*534] is required to meet the enablement requirement. *In re Samour*, in fact, states:

Whether or not [the claimed invention] has been made previously is not essential to a determination that a method of preparing it would have been known by, or would have been obvious to, one of ordinary skill in the art.

571 F.2d at 563 n.6, 197 U.S.P.Q. at 4 n.6. Therefore, the statements in *In re Samour* and *Donohue I* that the claimed invention was made previously serve to point out the absence of any strong evidence of nonenablement as in *Wiggins* and *Sheppard*. See *In re Donohue*, 632 F.2d at 126 n.6, 207 U.S.P.Q. at 199 n.6.

At oral argument, appellant also challenged the correctness of the CCPA's holding in *In re Samour* and *Donohue I* that several references can be used together to support an anticipation rejection. However, [*10] we are bound by the CCPA's decision in those cases. *South Corp. v. United States*, 690 F.2d 1368, 1370-71, 215 U.S.P.Q. (BNA) 657, 658 (Fed. Cir. 1982) (in banc). At the same time, we have no difficulty with the rejections made in *In re Samour* and *Donohue I*.

It is elementary that an anticipation rejection requires

a showing that each limitation of a claim must be found in a single reference, practice, or device. E.g., *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771, 218 U.S.P.Q. (BNA) 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026, 104 S. Ct. 1284, 79 L. Ed. 2d 687, 224 U.S.P.Q. (BNA) 520 (1984). The anticipation rejection used here, as in *In re Samour* and *Donohue I*, is not inconsistent with this rule. See *In re Marshall*, 578 F.2d 301, 304, 198 U.S.P.Q. (BNA) 344, 346 (CCPA 1978). The additional references utilized in this case (viz., Lincoln and Wagner) are not relied upon for suggestion or motivation to combine teachings to meet the claim limitations, as in rejections under 35 U.S.C. § 103. *In re Samour*, 571 F.2d at 563, 197 U.S.P.Q. at 4-5. Such reliance would be pointless, because Nomura alone discloses every element claimed. [*11] The purpose of citing Lincoln and Wagner is, instead, to show that the claimed subject matter, as disclosed in Nomura, was in the public's possession. *Id.* Therefore, the anticipation rejection based on Nomura, Lincoln, and Wagner is proper. n8

n8 Compare *Studiengesellschaft Kohle, M.B.H. v. Dart Industries, Inc.*, 726 F.2d 724, 220 U.S.P.Q. (BNA) 841 (Fed. Cir. 1984) (recognized exception occasionally permitting use of additional references in anticipation rejections but holding exception did not apply).

Appellant also argues that the references fail to teach the solubility characteristics and melting point range set forth in dependent claims 25 and 28, respectively. n9 However, where, as here, the dicarboxylic acid TMBP and dimethyl ester TMBP of Nomura are identical to the claimed invention, the properties of Nomura's compounds are inherently the same as those of the claimed invention in the absence of proof to the contrary. See *In re Best*, 562 F.2d 1252, 1255, 195 U.S.P.Q. (BNA) 430, 433-34 [*12] (CCPA 1977).

n9 Claims 25 and 28 read as follows:

25. The acid of Claim 2, said acid being soluble in ether and N-methyl-2-pyrrolidone.

28. The dimethyl ester of Claim 7, having a melting point of 128-129 degrees C.

In view of the foregoing, the board's decision is affirmed.

AFFIRMED